Global logistics trend spillover through container and RoRo shipping in North Europe short sea shipping

Jee Young Yoo

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GLOBAL LOGISTICS TREND SPILLOVER THROUGH CONTAINER AND RORO SHIPPING IN NORTH EUROPE SHORT SEA SHIPPING

By

Jee Young, YOO
Korea, Republic of

A dissertation submitted to the World Maritime University in partial Fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE
In
MARITIME AFFAIRS

(SHIPPING MANAGEMENT AND LOGISTICS)

2018

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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature): ........................................

(Date): ........................................

Supervised by: .................................

Supervisor's affiliation: ..........................
Acknowledgements

I give my best acknowledgement to my supervisor Professor Satya Sahoo and Niclas Mårtensson / CEO of Stena Line who gave me chance to expand my professional knowledge from container shipping to RoRo shipping. Also thanks to Professor Daniel Moon who showed me a way to World Maritime University in the first time, and Professor Song who supported and advised in various ways of my academic concerns. All the interviewee gave co-operative reactions and valuable insights what is happening in the industry nowadays, therefore also I’d like to express my acknowledgement to them. On the other hand, thanks to Patrik Almqvist / Network Manger of Stena Line who was supervisor in the company and assisted in various ways for my staying in Gothenburg.
ABSTRACT

Title of the Dissertation: Global Logistics Trend Spillover through Container and RoRo Shipping in North Europe short sea shipping

Degree: Master of Science

At present, North Europe Short Sea Shipping industry is facing their new logistics trend. More global logistics concept is flooded into North Europe, those are consolidation and low-cost with sea (container)-rail concept. Therefore, some professionals in RoRo shipping start to worry about their market absorb by container segment.

This research sighted primarily two factors are acting as main barriers which are “technical barrier” and “philosophical barrier”. However, it is sighted there is movement in some particular area such as Netherlands and Belgium, the container volume of short sea shipping is relatively increasing more than RoRo volume. The RoRo shipping market also already segregated into to part, freight focusing business plan and freight-passenger harmonized business plan, the gap between the companies are already big.

The RoRo shipping company in the freight focused business structure should do their utmost effort for “bloody competition”, they should expand to consider their competitor including freight forwarder and container shipping company deployed in short sea shipping. The company with freight-passenger harmonized business structure should consider if they may stay in their business structure, or dive into this new logistics trend although it will incur new massive financial investment will be included to secure new/bigger fleet and new business segment.

KEYWORDS: Logistics, Container, Container shipping, RoRo, RoPax, RoRo shipping, Short Sea Shipping, North Europe
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<table>
<thead>
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<th>Abbr.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>SSS</td>
<td>Short Sea Shipping</td>
</tr>
<tr>
<td>OBOR</td>
<td>One Belt One Road</td>
</tr>
<tr>
<td>AC</td>
<td>Accompanied unit</td>
</tr>
<tr>
<td>AMSA</td>
<td>Arctic Marine Shipping Assessment</td>
</tr>
<tr>
<td>CNTR</td>
<td>Container</td>
</tr>
<tr>
<td>ESN</td>
<td>European Shortsea Network</td>
</tr>
<tr>
<td>FEFC</td>
<td>Far East Freight Conference</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>Merge &amp; Acquisition</td>
</tr>
<tr>
<td>NE</td>
<td>North Europe</td>
</tr>
<tr>
<td>NEALL</td>
<td>North Europe to/from ALL countries</td>
</tr>
<tr>
<td>NENE</td>
<td>North Europe to/from North Europe</td>
</tr>
<tr>
<td>NSIDC</td>
<td>National Snow and Ice Data Center</td>
</tr>
<tr>
<td>NSR</td>
<td>North Sea Route</td>
</tr>
<tr>
<td>RoRo</td>
<td>Roll On / Roll Off</td>
</tr>
<tr>
<td>SCR</td>
<td>Suez Canal Route</td>
</tr>
<tr>
<td>TEU</td>
<td>Twenty-foot Equivalent Unit</td>
</tr>
<tr>
<td>UA</td>
<td>Unaccompanied unit</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>VTS</td>
<td>Vessel Traffic System</td>
</tr>
</tbody>
</table>
1. Introduction

The portion of seaborne trade taking in the world trade is significant and enormous. 90% of global trade by volume and 70% by value is done by seaborne trade (UNCTAD, 2017). As seaborne trade carry wide horizontal and vertical scope of various cargo types, it led to the complex segmentation or approach to carrying the various type of cargo. Likewise, the type of vessel has been segmented through the historical movement of trade. Obviously, the most significant and remarkable segmentation from the modern industry is containerization since the early 1950s when Malcolm McLean introduced container to the industry. After then, the main philosophy of container is standardization to carry general cargo, various products produced and palletized have been transferred its mode of carriage from other types of general cargo into the container. The wave of new logistics trend originated from the US by McLean, the wave spread over all around the world quickly, more and more countries became the part of same huge logistics flow, we generally have been called it “globalization”. However the global economy consists with various hierarchy with various regional and local economy. Due to those varieties, containerization sometimes could not spread into some region.

One of the typical regions is European Short Sea Shipping (SSS). SSS is dominant by semi-trailer transportation with RoRo shipping, not like in Asia. There are various reasons why RoRo shipping is stronger than container shipping in the European sector, however, with considering their origins, some logical reasons are 1) geographical aspect and 2) historical aspect. In both ways, somehow moving cargo between European countries by ship is efficient and effective, therefore they had their own developments. Comparing with European SSS, Far East Asia SSS is dominated by container shipping. There is also the various reason behind, but a certain reason is their whole logistics system is developed with the part of containerization.
On the other hand, even there were some barriers in particular region that prevent containerization, containerization itself has reached its maturity in terms of volume after 2008/9 global financial crisis. The market players who are directly involved in container shipping like container carrier are suffering due to high competition, in the end, a more efficient way of containerization is being developed and attempted under macroeconomic view. Therefore, more flexible and diversified container types are being approved by ISO, market player’s competition is leading to born global conglomerate container logistics company provide door to door logistics solution to the customer such as Amazon, DHL, Kuehne+Nagel, Maersk Line, and advanced technology such as e-commerce, automation, digitalization. In the end, the logistics market trend is now on their horizontal and vertical integration stage by adding their service value with more technology. This trend is happening in Europe since many cases are to be seen recently. For example, Containerships merge with CMA CGM (Millet, 2018), traditional RoRo shipping company such as DFDS and Cobelfret are building their RoRo vessel to fit with to carry container and trailer at the same time, DP World now have PnO (RoRo shipping) and Uni-feeder (Container shipping, one of the largest regional container feeder company in North Europe). Therefore it is very reasonable worries that traditional RoRo shipping company are worrying their position is sustainable or not, in the end, to set up efficient business strategies.

European short sea shipping has its various promotion center all over Europe, it has been developed with a support of EU’s policy support within European Shortsea Network (EU, 2018). Therefore their efforts to encourage to transfer the modal shift from road to sea transport work significantly. The advantage of shortsea shipping are 1) various network via hundreds of European ports, 2) cheaper than road transport, 3) reliable, 4) environmental friendly (less damaging), 5) guaranteed transit times, 6) one contact throughout the total door-to-door transport (ESN, 2018). However, it is well known in the industry that semi-trailer movement is closely connected with road
transport, container movement is closely connected with rail transport. Therefore, at the same time, there are actions to promote container usage by adopting such as European Intermodal Loading Unit (EILU), regardless detailed discussion about the effectiveness of the policy, it is clear that container volume is relatively increasing than semi-trailer volume in Europe.

So the question from industrial expertise in those areas is, “is semi-trailer still have logistics advantages container? What will be the next trend of European logistics trend in terms of transport mode and equipment?”. These concerns are more easily found in North Europe because most of the container hub ports are located in northern Europe, which means Rotterdam, Hamburg, Zeebrugge, and Felixstowe.

In conclusion, the author has 10 years intensive experience in global container shipping from seafarer to business strategist, therefore, by utilizing this experience co-operating with one of the biggest RoRo shipping company in North Europe, the research paper will investigate and elaborate the development of two different shipping method in North Europe SSS, to find out the sustainability of RoRo shipping in North Europe.
2. Literature Review

2.1. Deep Sea Container Shipping Industry

2.1.1. History

As per the World Shipping Council, the idea of using the same type of box to carry various commodity was not novel. Boxes similar to modern container were used for combined rail and horse transport in England as early as 1792. Also the US government used small standard-sized containers during the Second World War. In 1956, by Malcolm P. McLean, the first container loading was done in Houston. After he saw the potential development of container shipping, he bought an old tanker ship and modified to carry the container. Later then, he set up the container shipping company, Sea-Land, which successfully developed with the support of the military force of the US government during the Vietnamese war. After the nurturing and booming period originally started from US ports, sooner the efficiency was accepted world-wide which granted the participate more player in the container shipping industry. Sooner, Sea Land was acquired by Maersk Line which is market number one play until now, since then the trend of horizontal consolidation in the market by M&A or forming shipping alliance were accelerated and reached nowadays market situation with only 3 dominant shipping alliance which share more than 70% of overseas shipping market.

The earlier container ship was actually modified bulk vessels or tanker vessels that can load up to 1,000 TEUs. The first fully cellular container ship (nowadays model) was built in 1968 with higher speed 20~24 knots, and then it brought the requirement of the larger vessel with the growth of industry demand.

The one of the main factor to make containerization possible was that the containerization made the global trade with standardization and enormous cheaper price than traditional shipping business. Before container appears, it was obvious that
developed countries like US or EU that it is beneficial to produce the product outside of countries and import to their own countries or even export to other countries and make profit, however, the main barrier was the expensive shipping price and delayed delivery period from overseas which offset the benefit of producing cost. Therefore, it was dominant that the major trade also happened domestic not internationally.

However, containerization led to cheaper transportation cost compared with traditional, therefore at the first stage, it made visible benefit with trading overseas companies or countries to gain benefit from the logistics point of view. During that process, the big conglomerates appeared in the industry and started to build their production plant Far East Asia which boosted not only trade volume but also trade imbalance between the trading regions. Consequently, those production sites also gave chance to Far East Asia to be developed, and then led to the development of Asia big 3 shipbuilding industry.

2.1.2. Market Competition Development by the Container Carrier.

As the market grows, and due to the ambiguity of law governance, container shipping market bears its contestability easily. As Hirata (2017) identified well in the research paper, container shipping market became contestable markets with the two different form, liner conference and shipping alliance. Liner conferences have a pricing-setting objective and it is a multi-national shipping cartel, which is established in 1879 at first. Modern liner conferences concentrate mainly on routes to and from Europe until FEFC (Far East Freight Conference) abolished from 18th October 2008. Unlike liner conference, shipping alliance forms a coalition of its vessel but not involved in price setting. The main purpose was obtaining greater geographical coverage. Below the table is the summary of the major events regarding liner conferences and shipping alliances.
The world first alliance is introduced by Maersk and Sealand, they began to share their vessel in the Atlantic and Pacific oceans. After then forming alliance became the common trend for the container shipping company.

In the aspect of shipping alliance, Notteboom et al. (2017) are summarized the history of modern container alliance well in his research paper to identify the relevance between a shipping alliance and their port choice. Currently, in 2018, there are 3 shipping alliances in the global container shipping market, 2M, Ocean alliance, and THE alliance. Also according to Alphaliner, in 2017 Q1 & Q2, 99% trade volume between Far East Asia and Europe (including the Mediterranean) is dominated by those three alliances (2M 40%, Ocean alliance 41%, and THE alliance 27%).

<table>
<thead>
<tr>
<th>Year</th>
<th>Milestones</th>
<th>Source</th>
</tr>
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<tr>
<td>1879</td>
<td>The Far East Conference (later renamed to the Far East Freight Conference) was founded</td>
<td>FMC (2012)</td>
</tr>
<tr>
<td>1990s</td>
<td>Maersk and Sea-Land introduced alliance system and began sharing vessels in the Atlantic and Pacific oceans</td>
<td>Slack et al. (2002)</td>
</tr>
<tr>
<td>1995</td>
<td>Grand Alliance formed (Hapag Lloyd, NYK, NOL, P&amp;O)</td>
<td>Stopford (2009)</td>
</tr>
<tr>
<td>2011</td>
<td>G6 Alliance formed (APL, MOL, Hyundai, Hapag Lloyd, NYK, OOCL)</td>
<td>Maritime Executive (2011)</td>
</tr>
<tr>
<td>2014</td>
<td>2M Alliance formed (Maersk, MSC)</td>
<td>Maersk Line (2014)</td>
</tr>
<tr>
<td>2014</td>
<td>O3 Alliance formed (CSG, CMA-CGM, UASC)</td>
<td>CMA CGM (2014)</td>
</tr>
<tr>
<td>2014</td>
<td>CKYHE Alliance formed with Evergreen joined</td>
<td>Evergreen Line (2014)</td>
</tr>
<tr>
<td>2017</td>
<td>O3 Alliance to be renamed to Ocean alliance consisting of CMA(APL), Cosco(CSG), Evergreen, OOCL</td>
<td>SeaIntel (2016)</td>
</tr>
<tr>
<td></td>
<td>The Alliance to be formed with Yangming, Hapag Lloyd(UASC) and NYK/K-Line/MOL</td>
<td></td>
</tr>
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</table>

*Table 1. Timetable of major liner conference & shipping alliance, source: Hirata, 2017*
Table 2. Container alliance development, source: Notteboom et al. 2017.
The beginning of the shipping alliance was with the philosophy of profit-maximizing, however, the recent trend of shipping alliances is now the confrontation between various regional ownership. 2M can be a representative as European ship operator, Ocean alliance can be a representative as Chinese ship operator, and THE alliance can be a representative as Japanese.

2.2. Technical development of intermodal transport mode equipment

One of the important factors of container and trailer are their technical differences as a loading/delivering method of cargo. Containerization began with standardization, however various type of cargo carried by container inevitably boosted the development of the different type of container. Also, trailer equipment is originated in US 50 years before than container with the development of the car industry, so there are some fundamental philosophical differences in the background of the development of both equipment.

2.2.1. Container Equipment

1) ISO standard container

In the 1960’s the ISO mandated the standards for container dimensions. Since then, ISO 668:2013 specified the classification, dimensions, and ratings of series 1 freight containers which involved intermodal freight shipping.

The ISO standard container is the most commonly used container type, however with the historical development of container shipping industry since in 1950s, nowadays most commonly used container type for deep-sea route between Europe – Asia is 20ft, 40ft, and 40ft high cube container.
<table>
<thead>
<tr>
<th>ISO designation</th>
<th>Common Name</th>
<th>External dimensions</th>
<th>Minimum internal dimensions</th>
<th>Maximum Gross Mass</th>
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<tr>
<td></td>
<td></td>
<td>Length</td>
<td>Height</td>
<td>Width</td>
</tr>
<tr>
<td>1EEE</td>
<td>45 foot high cube</td>
<td>13.716 m / 45' 0&quot;</td>
<td>2.896 m / 9' 6&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1EE</td>
<td>45 foot standard</td>
<td>12.192 m / 40' 0&quot;</td>
<td>2.591 m / 8' 6&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1AAA</td>
<td>40 foot high cube</td>
<td>9.125 m / 29' 11.25&quot;</td>
<td>2.896 m / 9' 6&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1AA</td>
<td>40 foot standard</td>
<td>6.058 m / 19' 10.5&quot;</td>
<td>2.591 m / 8' 6&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
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<tr>
<td>1BBB</td>
<td>30 foot high cube</td>
<td>2.991 m / 9' 7.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1BB</td>
<td>30 foot standard</td>
<td>1.968 m / 6' 5.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1B</td>
<td>30 foot</td>
<td>1.460 m / 4' 9.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1CC</td>
<td>20 foot standard</td>
<td>2.591 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1C</td>
<td>20 foot</td>
<td>2.991 m / 9' 7.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1D</td>
<td>10 foot</td>
<td>2.591 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1E</td>
<td>6½ foot</td>
<td>1.968 m / 6' 5.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1F</td>
<td>5 foot</td>
<td>1.460 m / 4' 9.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ISO designation</th>
<th>Common Name</th>
<th>External dimensions</th>
<th>Minimum internal dimensions</th>
<th>Maximum Gross Mass</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Length</td>
<td>Height</td>
<td>Width</td>
</tr>
<tr>
<td>1CC</td>
<td>20 foot standard</td>
<td>6.058 m / 19' 10.5&quot;</td>
<td>2.591 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1C</td>
<td>20 foot</td>
<td>2.991 m / 9' 7.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1D</td>
<td>10 foot</td>
<td>2.591 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1E</td>
<td>6½ foot</td>
<td>1.968 m / 6' 5.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
<tr>
<td>1F</td>
<td>5 foot</td>
<td>1.460 m / 4' 9.5&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
<td>2.438 m / 8' 0&quot;</td>
</tr>
</tbody>
</table>

**Table 3. ISO Standard Container type and dimension, Source: ISO 668:2013**

*Most common type in Asia - Europe deep sea trade*
2) Non-standard and uncommon sizes

Fully cellular container vessels are designed to carry ISO standard containers. However, some regional trade is not fit for using ISO containers within their sectors, one of the typical examples is Europe. The main reason is the pallet size widely used in European SSS, Europallet. Its size is generally 1,200 mm x 800 mm, therefore it is not optimized to use an ISO standard container. Therefore, another type of container was introduced in EU, 45 feet pallet wide containers which has more inner width than ISO container. In the end, the European Commission introduce in their report to introduce European Intermodal Loading Unit (EC, 2003) to encourage of container and railway transport in EU, which has mere volume.

● 45 feet pallet wide containers

Pallet wide container have about 4 inches more than the standard container to accommodate more Europallets. External dimension is same with 45 feet ISO container, therefore it is compatible with traditional fully cellular container vessel. However for some RoRo vessel, it is not cost efficient due to the height restriction of the ramp, it is only to be loaded with a single stack, not double stack. This inefficient cost will burden for the customer’s higher freight payment then double stack loading.

Picture 1. Double stack loading (left), Single stack loading (right) (source: left- ECS, right- author)
Picture 2. Pallet loading plan in container (source: k-tainer)
Total pallet loaded in different container type is described in above picture. 7 pallets are loaded more in the 45 feet pallet wide container, therefore, almost of short sea shipping container is carried by 45 feet pallet wide container which is only equipment to compete with semi-trailer loading capacity.

- 48 and 53 feet containers

This size is introduced by container shipping company APL, and is used domestically in North America on road and rail. However recently abandoned due to the imbalance causing additional cost (JOC, 2013).

2.2.2. Trailer Equipment

1) History

Since the first production of automobiles by Karl Benz in 1888 in Germany, not only other early producer like Leon, Bollee, Edward Butler and Rudolf but also new joiner in the market accelerated the production of the automobile. Therefore, by 1900, mass production of automobiles had begun in France and the United States (Georgano, 1985).

In the similar period, world first Semi-trailer was invented by Alexander Winton who was car manufacturer, to carry their manufactured car to whom lived all over their country. (Cliff, 2017)

![An 1889 Alexander Winton semi-truck carrying a new car. This was likely the first semi-truck and car hauler in the U.S.](Picture 3. World first trailer, source: Cliff)
Since then, in 1914, by August Charles Fruehauf, the world first official “Semi-trailer” was invented to carry his boat which attached to a Ford. The production was hit, and four years later he founded a company “Fruehauf Trailer Company” which lasted until 1997 when US division acquired by Wabash National, the Japanese. However, they are still producing Fruehauf Trailer especially in UK, Germany, and Newzealand. Currently, more than 70% of total freight transportation is being done by trailer in the US on the other hand, about 45% in EU.

The type of semi-trucks is different in EU and US including Australia, which generally means EU uses modern type and the US uses conventional type. One of the advantages of conventional type is in the US it is usually owners are operator by themselves, which include more comfortable compartments in the truck. On EU, it is contrary. The second difference is in theory, the conventional trailer is more fuel efficient and easier to be produced. Finally, the maintenance is easier due to its convenience to reach the main engine.

Otherwise, there is the advantage of the cab-over truck too. First, the truck is lighter with shorter wheelbases which makes them easy to manoeuver. Second, they are more compact so they are more compatible with traffic circumstance in urban and also joining in another transport mode like RoRo shipping.

Also there are regulatory reason behind, one in EU is the length of semi-trailer when they are engaged in international trade (which also dominantly done in EU) is limited by 12 meters by EC after they debated to extend in 2015 but concluded to remain the limitation (Directive 96/53/EC), overall with exception for some countries.
Therefore they need to utilize the length of the trailer within that length which leads to the shorter design of the truck. However, in the US, a similar requirement revoked in 1986, so the length of the trailer can be much longer. Currently, the number of cab-over trucks in the US is constantly declining. The speed limit is also one of the reason. In EU, generally semi-trucks are limited to 90 km/h, however, in the US the limitation is higher to 129 ~ 137 km/h. This reason is why the US needs the conventional truck type with aerodynamics concept design.

Finally, the composition of road structure brought a difference. In EU, trucks should deal with the narrow street, winding country road, and cramped parking spaces. On the other hand, in the US, they have the more straightforward road with large space capacity to park (NODUM, n.d.).

2) Different type of trailer

For over hundred years, the technical design of semi-trailer is diversified and improved into many different types of trailer to carry its own type of cargo. According to the company TRUCK FREIGHTER, in large scope, the type of trailers can be divided into 1) Dry vans which commonly used to transport the parcel cargo, 2) Flatbed trailer which also used widely to carry steel coils or lumber, 3) Refrigerated trailer which used to carry frozen food and produce but sometimes pharmaceuticals, 4) lowboy trailer to carry heavy-duty construction equipment, 5) multi-car trailer to carry manufactured cars, 6) tank trailer to carry liquid cargo, 7) container trailer to carry container and 7) other types of trailer such as power only trailer, Conestoga trailer, stretch RNG trailer, extendable

<table>
<thead>
<tr>
<th>Dimension Limit</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor vehicle</td>
<td>12</td>
<td>2.55</td>
<td>4</td>
</tr>
<tr>
<td><strong>Trailer</strong></td>
<td><strong>12</strong></td>
<td><strong>2.55</strong></td>
<td><strong>4</strong></td>
</tr>
<tr>
<td>Articulated vehicle</td>
<td>16.5</td>
<td>2.55</td>
<td>4</td>
</tr>
<tr>
<td>Road train</td>
<td>18.75</td>
<td>2.55</td>
<td>4</td>
</tr>
<tr>
<td>Articulated bus</td>
<td>18</td>
<td>2.55</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4. Dimension Limitation for each type of carrying method, Source: Directive 96/53/EC
double drop trailers, side kit trailers, RNG trailer, specialty trailer, stretch single drop
deck trailer, extendable flatbed trailer, step deck trailer to use its own purpose of
 carriage. And total 33 europallets are to be loaded in a standard semi-trailer.

![Image](image_url)

*Picture 4. Europallet loading plan in box trailer, (source: Kogel)*

2.2.3. Comparison of load unit choice

A) Recent research

Since most of the current research papers are focusing on the vertical logistics view or
horizontal view with a different commodity, most of the research considering both of
points in container and RoRo are generally can be found on the public sector’s research
activity, that is EC. However, rarely, Woxenius and Bergqvist (2011) compared the load
unit choice of container and RoRo in their research paper in detail to find the possibility
of hinterland connection by rail, this table is most recent and reliable results to build up
the basic information to compare with container shipping and RoRo shipping.

<table>
<thead>
<tr>
<th>Comparison between the container and semi-trailer shipping segments.</th>
<th>Container</th>
<th>Semi-Trailer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic transport market</td>
<td>Transocean/deep sea/short sea</td>
<td>Intra-European/short sea</td>
</tr>
<tr>
<td>Modal competition</td>
<td>Air for deep sea leg/ Rail and road for feeder leg</td>
<td>Rail and road + fixed connections</td>
</tr>
<tr>
<td>Business priority</td>
<td>Utilizing economies of scale</td>
<td>Providing customer convenience</td>
</tr>
<tr>
<td>Port geography</td>
<td>Few large hub ports + feeder ports</td>
<td>Many ports - partly bridge substitute</td>
</tr>
<tr>
<td>Hinterland depth</td>
<td>Deep</td>
<td>Shallow</td>
</tr>
<tr>
<td>Transport time/speed</td>
<td>Fast</td>
<td>Fast</td>
</tr>
<tr>
<td>Precision</td>
<td>Day</td>
<td>Hour</td>
</tr>
<tr>
<td>Order time</td>
<td>Week</td>
<td>Day/minute</td>
</tr>
<tr>
<td>Frequency</td>
<td>Weekly</td>
<td>Daily/hourly</td>
</tr>
<tr>
<td>Transport service co-ordinator</td>
<td>Shipping line, line agent or sea forwarder</td>
<td>Shippers, road haulier or general forwarder</td>
</tr>
<tr>
<td>Cargo dwell time in port</td>
<td>Days</td>
<td>Accompanied - minutes or none/Unaccompanied - hours</td>
</tr>
<tr>
<td>Empty unit dwell time</td>
<td>Days/weeks</td>
<td>Hours/days</td>
</tr>
<tr>
<td>Port work content</td>
<td>Substantial</td>
<td>Limited</td>
</tr>
<tr>
<td>Rail technology</td>
<td>Very simple - flat wagon/twin locks</td>
<td>Complicated - pocket wagon/king-pin box</td>
</tr>
<tr>
<td>Road technology</td>
<td>Allowed at end points</td>
<td>Simple and accessible</td>
</tr>
<tr>
<td>Road-rail transhipment technology</td>
<td>Fairly simple - automation possible</td>
<td>Dimension factor in weight and handling</td>
</tr>
</tbody>
</table>

Table 5. Comparison between the container and semi-trailer shipping segments, Source: Woxenius and Bergqvist (2011)

However, this research paper aims container shipping and RoRo shipping not only choices of load unit, the additional factor should be considered not described on the table such as the operator’s competition differences in RoRo shipping and container shipping. Later, this research paper will also provide modified comparison table comparing the container shipping industry and RoRo shipping industry.

### 2.3. European Short Sea Shipping (SSS)

#### 2.3.1. Market Development

According to European Shortsea Network (ESN) which is the co-operation center of European shortsea promotion center, Short Sea Shipping (SSS) means that the movement of cargo and passenger by sea between ports geographically located in Europe or in non-Europe countries having a coastline on the enclosed seas bordering Europe. Therefore SSS includes domestics and international maritime transport, including feeder service along the coast, to/from the islands, rivers, and lake. Also, this concept at least covers the North Sea, the Baltic Sea, the Atlantic Ocean touching Northern Spain, Portugal, and West France, the Black Sea and the Mediterranean.
Amongst, European SSS market divided into two sub-sector largely, first one is the Mediterranean market and another is North Europe market divided by the geographical barrier which leads different commodity, different country, and different market player. Historically, the trade volume of North Europe takes 60% according to the volume of transport volume, and this market share is not significantly changed over a year.

In another view, the trade structure by cargo type also varies depending on the region, Northern Europe is the more active market in terms of commodity trade volume than the Mediterranean market. Also, most of the trade volume in the Black Sea consists of commodity trade. Also, RoRo trade is more active than container trade in Northern Europe, there are many reasons but some of the reason is that geographically Northern Europe is more suitable to build up RoRo route with bridge concept and this reason includes the UK which is most active RoRo trade volume in whole Europe.
And with the dimension of country, UK, Netherlands, Italy, Turkey are most active on the short sea shipping trade in Europe, it can be interpreted that 1) the country which has islands are possible to have high trade volume on short sea shipping to redistribute domestic cargo and 2) the country which have big hub ports for example Rotterdam in the Netherlands has high traffic on short sea shipping to redistribute the cargo to the final destination.
On the other hand, North Europe market which is the target market of this research has highest traffic volume with liquid bulk cargo, however especially the traffic volume on RoRo is much higher than Container in this market. This fact denotes that more RoRo operator is involved in this industry (high competition market) and there may be the barrier preventing the global wave of containerization in this market.
2.3.2. Trade Volume development in North Europe

To identify trade volume spillover by country and transport type in a macroeconomic view, 6 different series of data were used (1) NEALL_CNTR, 2) NEALL_RORO_AC, 3) NEALL_RORO_UA, 4) NENE_CNTR, 5) NENE_RORO_AC, 6) NENE_RORO_UA). List of codes used for the data labeling is as below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEALL</td>
<td>North Europe from/to All countries except North Europe</td>
</tr>
<tr>
<td>NENE</td>
<td>North Europe from/to North Europe</td>
</tr>
<tr>
<td>CNTR</td>
<td>Container</td>
</tr>
<tr>
<td>RORO</td>
<td>Roll on / Roll off</td>
</tr>
<tr>
<td>AC</td>
<td>Accompanied</td>
</tr>
<tr>
<td>UA</td>
<td>Unaccompanied</td>
</tr>
</tbody>
</table>
Graph 5. NE from/to International Trade volume: Total volume vs Portion of container/RoRo accompanied/RoRo unaccompanied, Source: Eurostats (1/2)
Graph 6. NE from/to International Trade volume: Total volume vs Portion of container/RoRo accompanied/RoRo unaccompanied, Source: Eurostats (2/2)
Graph 7. NE from/to NE Trade volume: Total volume vs Portion of container/RoRo accompanied/RoRo unaccompanied, Source: Eurostats (1/2)
Graph 8. NE from/to NE Trade volume: Total volume vs Portion of container/RoRo accompanied/RoRo unaccompanied, Source: Eurostats (2/2)
From the graph displayed above, below facts were found.

- Total cargo handling volume in NE including deep sea cargo, 60% is container 40% is RoRo cargo, however excluding deep sea cargo (short sea shipping), 70% is RoRo 30% is Container cargo from total trade volume within NE

- These differences are mainly due to heavy handling volume in some particular country which has hub port of container (Belgium, Germany, Netherlands, UK, France, Spain) with deep sea cargo

- In most country, RoRo traffic volume is higher than container handling volume for short sea shipping, however, the country located with hub port has diversified connection with container feeder, therefore still container handling volume is larger than roro handling volume

- Eastern Europe is growing rapidly with its handling volume due to production plant relocation in recent few years. (Poland, especially)

- Overall, even within short sea shipping, the portion of container carriage is increasing higher rate than RoRo

- There are many other surrounding circumstances or event which could affect this trend: (Cabotage, Container feeder development, Arctic Route, Silk Road, Trade War, horizontal & vertical competition in the logistics sector in North Europe, Brexit… ETC)
2.4. Potential factors affecting future development

2.4.1. Northern Sea Route

1) History

Traditionally, Arctic sea navigation was dominated by the Soviet Union and Russian Federation when they have existed until the 1990s with reaching its peak of 6.6 million tonnes in 1987. After then, the idea of maritime navigation via Arctic Sea has been envisaged over time, however, the fact that the Arctic Sea is not ice-free even in Summer didn’t allow to increase maritime transport significantly.

In economic aspects, clearly it was not economical to some certain industrial parties such as Container due to the vessel needed to be escorted by the Russian navy vessel, therefore the traffic between that area was primarily done by the liquid merchant vessel, research and expedition vessel during Summer season since 2004.

In 2008, the Arctic sea experienced ever an ice-free condition which happened during Summer season in the first time with the environmental issue of global warming, and then maximum ice extent was greater than the maximum coverage observed during last five year. This denoted that the fluctuation of ice extent between summer and winter season became greater and finally suggested that navigating via the Siberian coast was highly visible. Also, in the same period, some economic situation including the high fuel prices, increasing traffic volume of Singapore which the congestion increased steadily over time and overheating competition of liner shipping industry which participations needed faster transit time than their competitors accelerated ship operator’s curiosity about the Arctic Sea route.
In spite of the arising concerns of the shipping industry about the Arctic Sea route, some barriers restricting the vessel operation remained to be solved (Ho, 2010). At first, environmental monitoring and forecasting including meteorological, oceanographic and sea ice information services to support ship operator should be enhanced. Secondly, search and rescue including icebreaking service should be provided in a comprehensive manner considering with seasonally increased traffic volume. Thirdly, the experienced human resource including the crew of merchant’s vessel to be operated safely is needed. Fourthly, new ship technology is required for independent ship operation in ice-covered waters. Fifthly, it is necessarily implementing the proper Vessel Traffic System (VTS) to prepare the increasing traffic volume. Finally, the integrated proper regulatory framework in that area should be set up.

However, also it is undeniable that the maritime industry has been envisaging the possibility of the Arctic Sea route, recently happened some economic and environmental events boosted their efforts.
2) Container transport within Arctic Sea

Zhang and Meng identified the traffic within the Arctic Sea from 2009 to 2014, and the result shows the traffic lasts 5 months in Summer. Also as the statistic shows, the trade volume within those areas is dominated by liquid cargo, however, there is a growth in container cargo transportation.

![Graph 10. Transit frequency and volume tonnes in NSR, Source: Zhang and Meng](image)

The majority of academical approach to Arctic Sea is the extent of ice, however, there is some discussion of commercialization on the transportation of container cargo within those areas by Furuichi and Otsuka 2014, Liu and Kronbak 2010, Verny and Grigentin 2009, Lee and Song 2014. One of the important factors which should be considered is the navigable period in a year, which forecasted about 100 days in a year until 2080 with maximum 180 days. (AMSA 2009, Ragner 2008). And if the trend of melting keeps its current speed, the whole ice will melt down by 2030 as per prediction of Mark Serreze at NSIDC in the US.

On the aspect of distance-day saving with NSR, Lee and Song identified the usage of NSR will shorten the distance about 40% with variation depend of ice and original port and transit time will be reduced from Chinese port (Dalian to Ningbo) to Northern Europe port 5~8 days, from Korea port 6~9 days, and from Japan port 8~10 days. So
finally, if all the trend remains the same, they forecasted the traffic of container will be 94.5% via NSR in 2030.

On the other hand, Furuichi (2014) approached the commercialization of the NSR from the aspect of vessel operation cost, which concluded it is feasible. One of the reasons that the usage of NSR remained an experimental area for container operator is the building cost of new ice-class of 4,000TEU were about 180 million USD with four times higher than normal vessel (Verny & Grigentin, 2009). And Liu and Kronbak (2010) simulated a feasible case for the container transport, however, it is only feasible when the NSR cost is free and the fuel cost is higher than between 700~900 USD/ton. Omre (2012) examined the most feasible scenario for NSR container shipping with a combination of NSR and SCR (Suez Canal Route) by building up a yearly operation basis. Furuichi built up the scenario with the cost components including capital cost, NSR fee, SCR fee, crew cost, maintenance cost, insurance cost, fuel cost, and port dues. Consequently, the research concluded NSR/SCR combined shipping will reduce its unit cost from 10~28% than traditional SCR shipping regardless of vessel size.

Graph 11. Unit cost calculation, Source: Omre 2012
3) Recent Activity

The actual attempt to use NSR by containership was started with the first attempt at MV. Yong Sheng which operated by COSCO Group, however, the type of vessel was heavy lift multi-purpose vessel and it took 35 days for transit. However the attempt or consideration to use NSR was continuously done by the various global shipping company, finally the leading container shipping company Maersk decided to deploy full container vessel in the route Vladivostok – St.Petersburg (Maersk trials Arctic Sea route, 2018).

4) Impact on OBOR

Some concern may arise that the increasing container traffic on NSR will be a threat to the Railways traffic from China to Europe, however, the fact that the Arctic area is one of the components of OBOR initiative, and Chinese concern on the resources in Arctic Sea and yet the Railway traffic volume are recently boosted yet too much smaller than sea traffic, furthermore the container traffic development on the NSR are just started with Maersk in 2018, in a near-term it will not be threat to the railway, however in long-term NSR will not only threat to railway but threat for all other transport mode include traditional SCR.

Once NSR is activated and gain enough liquidity of traffic volume, those areas will be attractive to the ferries or cruise for tourism. With the Chinese interest on the Arctic tourism, the amount of traveler is more than doubled from around 20,000 in 2010 ~ 2011 to 45,000 in 2016 ~2017.

2.4.2 Cabotage & Anti-trust regulation

Cabotage within EU is one of the contributing factors which made short sea shipping to be developed. By the Council Regulation 3577/92, Article 1, almost Member State liberalized on the cabotage subject to ship register in and flying the flag of a Member State. With the support from liberalization in such way, the trade barrier between EU
countries are almost lifted up, therefore consequently brought volume increase of short sea shipping within EU.

On the other hand, EC’s strong position about anti-trust of shipping carrier also encourages fair competition within the short sea shipping. That means otherwise global liner shipping market is dominated by shipping alliance, which able to execute bargaining power to the market, short sea shipping is not able to form shipping alliance to be a dominant position in the market. Therefore, container feeder company is almost impossible to provide service frequency by sharing vessel capacity between feeder company, which fundamentally lead to keep each traditional position of RoRo and container shipping market within short sea shipping.
3. Methodology

3.1. Framework of the Research

This research approaches the raised topic with two different methods of research. First one is qualitative approach with interviewing with various expertise to find a clue for the current market trend and their expected risk exposure, and build-up firm theoretical background for the findings from the quantitative results from statistical analysis.

Another one is the quantitative approach, which starts from the wide area of macroeconomic statistics analysis approach and then narrowing to micro-economic statistics analysis specifically related to the research topics. Originally, DCC M GARCH model proposed by Tsouknidis (2016) supposed to be built to find a volatility spillover through container shipping market from/to RoRo shipping market, however, time series data gathered from a data source, Eurostat, are not enough to build the econometric model. Otherwise, it means that the relevance between data can be found with various simple statistical analysis results.

Therefore, the whole research framework is divided into some parts, it will segregate the container shipping market and RoRo shipping market at first. And then with a qualitative approach from the interview and own research and quantitative approach with Eurostat data and part of company data, market status and characteristic will be investigated to identify the difference between two markets. At second, from Eurostat data, the past and present status will be investigated by comparing timeseries trade volume change, and interview & own research information is used to assume future market movement. Therefore this step will include the measurement of market transition in the past, present, and future. At a similar step, driving factor and barrier will be elaborated by a qualitative approach with interview and own research.
Degree: past & present – Quantitative / Eurostat
future – Qualitative approach / interview, research

Driving factor: Qualitative approach / Interview

Market research: Qualitative /
Quantitative approach / Eurostat,
interview & research

Restriction/Barrier: Qualitative approach / interview, research

Picture 5. Research framework, by author
3.2. Qualitative approach

1) Interview

The research is done through close co-operation with one of the leading RoRo company in North Europe. Therefore, interviews for the various position of the company such as a commercial manager in Poland, Netherlands, Germany, and UK, network manager, fleet operator, and port operator were available, which increased the reliability of the report. And additionally, two different dimensions of the freight forwarder, one is focusing on the trailer business especially focusing on between Ireland/UK and France/Belgium/Netherlands. Their business scope is focused in a trailer in the major, and they own equipment and drivers to provide service to the customer.

<table>
<thead>
<tr>
<th>List of Interviewee</th>
<th>Working Company</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 1</td>
<td>A</td>
<td>a</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Interview 2</td>
<td>C</td>
<td>b</td>
</tr>
<tr>
<td>Interview 3</td>
<td>D</td>
<td>c</td>
</tr>
<tr>
<td>Interview 4</td>
<td>E</td>
<td>d</td>
</tr>
<tr>
<td>Interview 5</td>
<td>F</td>
<td>e</td>
</tr>
<tr>
<td>Interview 6</td>
<td>G</td>
<td>f</td>
</tr>
</tbody>
</table>

Table 6. List of Interviewee and assessments

2) Own research

Based on the research topic and factors identified by the interviewee, own research by taking a look additional research paper for similar topic or market paper such financial report or news article will be elaborated to use in the research paper. Most of them are included as a reference in the reference list of this research paper.
3.3. Quantitative approach

3.3.1. Modelling

Originally, the research approached with building econometrics modeling widely used in the financial market to identify volatility relevance among container and RoRo shipping market in northern Europe, however as per Hwang (2010), minimum 250 observation of time series data is needed in case of ARCH (1), and at least 500 observations of time series data is needed in case of GARCH (1,1) models, the current data volume is not enough to build a precise volatility spillover measuring tools such as ARCH (Engle, 1982), GARCH (Bollerslev, 1986), EGARCH (Nelson, 1991), and initially proposed model with DCC M GARCH (Engle, 2002).

However, the data set gathered for this data has various panel aspect of the market, and the scope of research contains macroeconomic view which contains various factors, therefore basic statistic tools/graph will be used to scope the degree of market transfer or identify the trend (container -> trial or vice versa). One of a difficulty in the research was transparent market data. There is no clear data to compare container volume and trailer volume at the same time, therefore, Eurostat which is the most transparent accessible data at the market were used. From this research, it is identified that the container volume is segregated with deep sea cargo volume and short sea cargo volume, which the previous one is transported by ISO standard container and the latter one is transported by 45feet pallet wide container. However, short sea volume includes deep sea feeder volume from international trade;

\[ T_D = R_D + C_D \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 1 \]  
\[ T_S = \alpha R_D + R_S + \beta C_D + C_S \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 2 \]

Where, \( T \) denote total trade volume, \( R \) denote RoRo volume, \( C \) denote container volume in 000 tonnes.
\( \alpha \) denote RoRo shipping feeder rate coefficient by short sea transport, \( \beta \) denote container feeder rate coefficient by short sea transport \( (\beta < 1) \).

From equation 1), RoRo deepsea volume is not significant with less than 5% of total volume,

\[
T_D = C_D \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad 1 - 1
\]

From equation 2),

\[
T_S = R_S + \beta C_D + C_S \quad \ldots \quad \ldots \quad \ldots \quad 2 - 1
\]

And because container deepsea volume are identified to be carried by 20feet and 40feet ISO container significantly only (approximately 90%), and shortsea volume are identified to be carried by 45 feet pallet wide container only from this report,

\[
C_D = C_{ISO} \\
C_S = C_p \\
R_S = R_T
\]

Where, \( C_{ISO} \) denote ISO container volume, \( C_p \) denote 45feet pallet wide container, and \( R_T \) denote all type of semi-trailer volume transported by RoRo shipping. Therefore finally, volume relation between cargo type is described as below;

\[
T_{St} = R_{Tt} + \gamma_t + C_{Pt} \quad \ldots \quad \ldots \quad \ldots \quad 3
\]

Where, \( \gamma \) denote deep sea ISO container volume transported in the short sea. The main process for this analysis depends on the data refining, which raw data containing more than 200,000 rows \( \times \) 72 timeseries quarterly data. Finally, the graph of container volume for each country in Europe is extracted and described as in further graph.
On the other hand, the factors mainly observed its fluctuation in the time series is, volume relativity between $C_P$ and $R_T$, following methods were being used.

A) Correlation $(T_D, T_S)$

B) Company data (trade volume for specific sector, financial data)

3.4. Data

3.4.1. List of Data

Three type of major data source were used in this research paper. 1) Eurostat for timeseries trade volume by country pair, by cargo type, and by deepsea/shortsea sector, 2) Some of companies’ trade data in real to give example, and 3) financial data of company to assess the financial performance of the company.

1) Eurostat

Data from Eurostat is most publicly accessible and transparent by providing lowest hierarchy with the port to country and subcategory of cargo types such as container type (20ft, 20~40ft, 40ft, greater than 40ft, full/empty) and trailer type (accompanied and unaccompanied). However, some reporting countries have a high ratio of “unknown cargo type” or “unknown partner country” so data reliability check was done and did some correction to use in the research.

1-1) Data reliability of Continaer/RoRo volume comparison

For this part of the analysis, a portion of unknown cargo type is not necessary to be considered due to cargo type will be considered middle hierarchy “container, RoRo accompanied or unaccompanied” which include unknown data already. Therefore volume portion from unknown reporting country is compared with full data.
Graph 12. Unknown partner country volume portion per reporting country (by Author, data source: Eurostat)

Netherland data was significant to use, however it is corrected by distributing the volume from unknown reporting country by distributing the portion of reporting countries previous quarter.
1-2) Data reliability of Container volume compare

Generally, it is being used to use the unit as a measurement in the container market. With this, trade volume can be divided into the full unit and empty unit, therefore pure full container volume movement can be extracted with this dimension. This is to do segregate the volume of 45 feet container and ISO container, in spite of Eurostat data does not distinguish 45feet and 45feet pallet wide container, 45feet ISO volume can be ignored, it is considered greater than 40feet in this data considered as a 45feet pallet wide container. And, in the end, unknown reporting country and unknown cargo type should be considered both. Correction cannot be done at this step because it is so complicated that can be another research area or large human resource needed.

Graph 13. Unknown partner country portion, (by Author)

Graph 14. Unknown reporting country portion, (by Author)
As a result, Netherlands are reporting both unknown cargo type and partner country, therefore it is excluded in the report. And France is unreliable too because only their total figure is reliable with 90% of its sample size. On the other hand, Latvia is completely unreliable from 2005Q1 ~ 2007Q2, however, it is not significant to the whole trend or results, it is accepted. Otherwise, Sweden and the UK have unreliable data around 10%, however, it will be accepted by considering these two countries as “middle-level reliability”. Overall, data reliability was assessed as below 3 level, level 3 = highly reliable, level 2 = moderately reliable, and level 1 = unreliable.

<table>
<thead>
<tr>
<th>Cargo Type</th>
<th>Country</th>
<th>Empty</th>
<th>Total</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Belgium</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Germany_North Sea</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Germany_Baltic</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Denmark</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Estonia</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Spain_Atlantic</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Finland</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>France_Atlantic</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Ireland</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Lathuania</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Latvia</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Netherlands</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Norway</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Poland</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Sweden</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>UK</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

*Level 1 = Unreliable, Level 2 = Moderately reliable, Level 3 = Highly reliable

Table 7. Data reliability by country

On the other hand, as the portion of Netherlands in North Europe container traffic is high, more or less 25% of total traffic, logical estimation were process to produce data of Netherlands
2) Company data

Data from the major cargo forwarder involved in semi-trailer and container (more focusing on trailer) was being provided for the research. The data set is consisted with 5 years data with monthly frequency, for France – Ireland route.

3) Financial data

Financial data of DFDS were being used from their annual report to assess their performance in each region after they acquired Norwegian Line with quarterly basis from 2011Q1 to 2017Q4.
3.4.2. Volatility of the each market

First of all, volatility cluster are sighted during 2008 ~ 2009 global financial crisis, however some volatility cluster are sighted partially for example NENE_RORO_UA during 2001~2003, NENE_CNTR, and NEALL_RORO_UA.

Graph 15. Volatility cluster of data series
3.4.3. Correlation

Table 8. Correlation Coefficient Table

<table>
<thead>
<tr>
<th></th>
<th>NEALL_CNTR</th>
<th>NEALL_RORO_AC</th>
<th>NEALL_RORO_UA</th>
<th>NENE_CNTR</th>
<th>NENE_RORO_AC</th>
<th>NENE_RORO_UA</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEALL_CNTR</td>
<td>100.00%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEALL_RORO_AC</td>
<td>57.15%</td>
<td>100.00%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEALL_RORO_UA</td>
<td>75.68%</td>
<td>65.34%</td>
<td>100.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NENE_CNTR</td>
<td>89.49%</td>
<td>52.88%</td>
<td>73.95%</td>
<td>100.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NENE_RORO_AC</td>
<td>58.87%</td>
<td>99.53%</td>
<td>66.79%</td>
<td>54.82%</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>NENE_RORO_UA</td>
<td>67.62%</td>
<td>60.94%</td>
<td>97.89%</td>
<td>67.80%</td>
<td>62.51%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

1) As correlation test results show, RORO market is highly correlated (more than 95%) between the deep sea market and short sea market. This means that there exist only a very small amount of market differences, potentially concluded that there is almost no deep sea RoRo trade volume in North Europe.

2) Container market is correlated between the deep sea market and short sea market, however international cargo is not 100% flow into the short sea market, therefore there are differences in correlation.

3) Container and RoRo market is not highly correlated in any way, therefore it is potentially suggested that there exist market differences.
Graph 16. Scatter plot of correlation matrix
4. Analysis

4.1. Cargo Trade flow

4.1.1. Deep sea inbound

Graph 17. International maritime inbound cargo ratio by country. (By Author, data source: Eurostat)

More than 90% of international inbound cargo are flooding into 4 countries only, those are Netherlands 29.5%, German 24.5%, Belgium 21.9%, and UK 15.1% in 2017Q4. At the same time, 97% of international maritime inbound cargo is the container. There is some RoRo cargo surprisingly, however, this includes pure car carrier.

<table>
<thead>
<tr>
<th></th>
<th>CNTR</th>
<th>RORO_UA</th>
<th>RORO_AC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017Q4</td>
<td>96.93%</td>
<td>0.88%</td>
<td>2.19%</td>
<td>41,620</td>
</tr>
</tbody>
</table>

Table 9. International inbound cargo portion by cargo type. (By Author, source: Eurostat)
With this figure, it is crystal clear as it is well-known fact, most of the international inbound are done by container, not RoRo.

*Picture 6. Deep sea container inbound trade flow, (by Author, data source: Eurostat)*

Therefore, some facts can be discussed with these results, 1) Ireland presumably may have larger SSS trade volume with 4 container hub countries, 2) Scandinavia countries may have high SSS trade volume between continental countries, 3) Eastern countries may receive international cargo by land transport from central Europe or directly by railway from Far East Asia, and 4) European railway systems are maybe mostly developed in central Europe and then spread to other regions.
4.1.2. Short sea outbound

Graph 18. SSS outbound cargo portion by country, (by Author, source data: Eurostat)

Short sea outbound includes not only regional cargo traffic between countries but also includes short sea container feeder traffic volume. Therefore, the portion of trade volume is well diversified relatively than the deep sea inbound trade portion.
Graph 19. SSS outbound by country and cargo type (1/2). (by Author, data source: Eurostat)
Graph 20. SSS outbound by country and cargo type (2/2). (by Author, data source: Eurostat)
This graph shows their trade volume grow of each country with the development of the portion of each cargo type. This result implicates some potential conclusions, 1) most of the countries are dominated by RoRo trade, overall, whole North Europe region has 70% of trade traffic with RoRo and 30% is container, 2) below statistic implicates that among 30% of container traffic in short sea shipping, most of them are feeder container traffic for distributing deep sea cargo to each country. Also, EC reported that around 50~60% of the international container is distributed by rail and road for biggest ports.

<table>
<thead>
<tr>
<th>Deep sea inbound</th>
<th>Short sea outbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017Q4</td>
<td>39,159</td>
</tr>
<tr>
<td></td>
<td>23,257</td>
</tr>
</tbody>
</table>

*Table 10. Deep sea inbound and short sea outbound container cargo volume, 000tonnes. (by Author, source: Eurostat)*

Therefore, considering author’s result and EC’s result, most of feeder container traffic is actually from deep-sea inbound, 3) most of countries’ SSS trade volume is dominated by RoRo cargo, it shows stronger result in Scandinavia countries, Ireland, and the UK, 4) Eastern Europe countries’ trade volume is increasing in large portion recent 4~5year, 5) Unaccompanied RoRo unit is increasing in Ireland.

And according to an interview with trailer focusing freight forwarder, they forecasted the bright future of trailer and are expanding their business portion in the trailer due to the overall depression on container growth in Ireland. According to the data provided, the volume of the trailer is proportionally increasing, however, this growth is mostly done during 2014~2015 and recent 2 years shows depression of both container and trailer growth.
Graph 21. Container vs Trailer YoY growth rate of company B on France – Ireland, (by Author, data source: B)
4.1.3. Short sea inbound and Deep sea outbound

Overall trade volume for opposite direction is almost similar, therefore will not be mentioned in detail.

4.1.4. Container inbound and outbound (ISO vs 45 feet container)

It is often used in container shipping as measurement unit TEU. Combined data provided in Eurostat containing RoRo and Container provides only a unit as 000 tonnes, TEU data is separately used to investigate deep sea container and short sea container movement in North Europe.
Graph 23. Short sea shipping Container Inbound and Outbound volume and portion of 45feet container (1/2), (by Author, data source: Eurostat)
In short sea shipping, the volume of container traffic is around 10%, however, the portion of the 45feet container are increasing in recently 3 years. If the fact that almost of short sea shipping container volume is 45feet pallet wide and 45 feet ISO container volume in deep-sea trade is not significant applied, portion increasing 45feet in short sea shipping means the growth rate of 45 feet pallet wide container is increasing faster than deep sea shipping. This increase is significant in Belgium, which means the backup data of the interview with the 45 feet pallet wide container focusing freight forwarder.
In other countries, overall the volume of 45feet are increasing faster than total short sea shipping volume, except Ireland and Denmark. The slow-growing rate of short sea shipping container volume in Ireland follows the interview with trailer focusing freight forwarder. The data of Finland shows a high portion of short sea shipping container, however, there is no way to confirm if this information is right or not.

On the other hand, it is slightly balanced for inbound and outbound volume for the North Europe region, however, there is an imbalance in Ireland and Belgium. And, for Eastern Europe countries, the total volume of container outbound is growing faster with exceeding inbound volume in recent years.
Graph 25. Deep sea shipping Container Inbound and Outbound volume and portion of 45feet container (1/2), (by Author, data source: Eurostat)
If we look into deep sea cargo volume, a total volume of 45feet is about 3~5%.
Comparing with short sea shipping volume, this means most of the 45feet container trade happens in short sea shipping. The data of Lithuania, Latvia, Norway, and Estonia is not reliable and insignificant due to lack of deep-sea cargo trade volume. These countries are receiving their cargo from hub countries such as the Netherlands, Belgium, and Germany. Most of the cargo are loaded/discharged in hub countries (more than 90%), and few of deep-sea cargo are traded directly discharged into other countries.

Graph 26. Deep sea shipping Container Inbound and Outbound volume and portion of 45feet container (2/2), (by Author, data source: Eurostat)
4.2. Market competition

4.2.1. Container feeder company

According to Harboursreview (2018), there are 22 container feeder companies providing services in North Europe excluding deep sea carrier. Among them, there are some companies providing their service to the country to country, on the other hand, there are large feeder companies have a network covering all North Europe such as Containerships, MacAndrews, Seago Line, Unifeeder, and Xpress feeder. The market is accelerated their competition by the horizontal and vertical competitor in logistics. CMA CGM (2018) announced the acquisition of Containerships to strengthen its intra-European logistics solution. A few months earlier, CMA CGM (2018) announced their investment on CEVA logistics. It is frequently to be seen that global container carrier try to extend their business area within the whole door to door logistics sector, therefore, the container feeder company have exposed the risk from deep-sea container company. Seago Line is also the good example. The company is subsidiary of world biggest container carrier, Maersk Line, and their network are well connected with Maersk Line’s deep-sea network. One interesting point is, recently Seago Line announced to deploy 3,600TEU fleet in North Europe (Hollmann, 2018). Therefore, it is obvious that global carrier expanding their logistics value closer to door to door by expanding their business area into European short sea container feeder market. Similarly, this trend is also sighted recent movement of global port operator, DP World. By acquiring P&O Ferries in 2006, and acquiring Uni-feeder, one of the largest container feeder company in North Europe, the company now can provide integrated service including container and RoRo short sea shipping. In conclusion, container feeder companies are the part of international trade, therefore they are more exposed to the global company’s strategy to expand their logistics solution to end-user stage, and actually it is dominantly happening in the market.
4.2.2. RoRo Company

According to Harboursreview (2017), there are more than 40 RoRo / RoPax operators in North Europe. Each one of them has its unique service area and service port pair, only a few companies provide service to the whole North Europe region, those are Stena Line, DFDS, and Cobelfret for example. Therefore comparing the movement of those three companies are effective to read the trend happening in the SSS market in North Europe. From the beginning, the author tried to catch supply amount by lane meter or gross tonnage to compare each companies’ market share, however, due to the frequency of each service is different from all service port pair (on contrary, container service is commonly weekly service so it is valid to consider total vessel capacity equals total market supply), it turns out to measure actual supply quantity to the market can be another research project.

DFDS provides freight and passenger service at the same time, however, their main focus is freight service. This company is one of the most aggressive company to expand their market share in various way, it started with acquiring Norfolkline in 2010. The company became the largest combined shipping and logistics company (DFDS, 2011), at the same year they changed their division from by dividing transport mode (RoRo, Passenger, and Container) to by dividing business area (Baltic, North Europe, Mediterranean, and so on). This implicated they will expand their business area into the different region in Europe, and it is actually happening nowadays. In 2018, they announce to acquire one of the largest RoRo company in the Mediterranean, UN RoRo. Also, they officially expressed their interest and tried to expand the ferry market in 2013 by the trial of acquisition Scandlines, which failed in the end. DFDS provides land logistics solution too, therefore, they are advertising themselves as the door to door service provider.
Overall, their strategy focusing on the freight sector gave a positive result. As per the financial report of DFDS from 2011 to 2017, the revenue grew 27% especially the revenue increased from Channel division and decreased Passenger division.

Graph 27. DFDS Annual revenue and portion by business segment, (by Author, source data: DFDS)

Graph 28. DFDS volume growth of Freight (lane meter) and Passenger, (by Author, source data: DFDS)
Cobelfret is not publishing its own financial report, therefore the information is somewhat restricted than others. Most of the recent their movement are from the interviews. Cobelfret is also freight-focused RoRo company. Likewise the other two companies, they are expanding their fleet, and recently they built a RoRo vessel with higher entrance ramp which makes available double stack high-cube containers to be loaded. Therefore, in the market, this company is considered more like ConRo shipping company which provide all kinds of standardized cargo carrying service. Likewise DFDS, Cobelfret also has their own land logistics service, so they are representing their position as the door to the door logistics solution provider.

On the other hand, Stena Line has a unique position amongst the three of them mentioned above. These companies have mere land logistics service and also doesn’t have any own trailer equipment, therefore, positioned themselves as “pure carrier” which provide only vessel spaces to the customer. They are investing to acquire more routes, however, they are very careful to expand the vertical area of logistics markets such as container or land logistics solution. According to the Stena Line financial report 2017, about 55% of profit belongs to freight 45% of profit belongs to the passenger. Therefore, it is assessed that they are positioned themselves as a traditional Rolex operator to provide only sea carriage service through the various regions.

Therefore in these different strategies among 3 largest RoRo carrier in the North Sea, DFDS and Cobelfret are participating in the global logistics trend. They are expanding their business scope in the different market, however, there is some critical point for this strategy. From various interview source revealed their opinion that DFDS and Cobelfret have the wide business area, they are exposed more risks of the market. First of all, they should care of land logistics too, however, due to recent severe trucker shortage issue in whole Europe area, they are facing the problem with relocating their equipment, or with high cost possibly. This implicates in other ways, due to their market position, their customer is their competitor at the same time, therefore their expanded businesses are
interrupting each other in some ways. In conclusion, Short sea shipping in North Europe tends to divide into two different ways, participating in competition as a logistics provider, or strengthening their own position as a pure carrier.
5. Empirical Results

Summarizing interviews with shipping company and freight forwarding company and analysis of statistic data from Eurostats the logistics trend of Container and RoRo shipping are summarized with 3 stages of past, present, and future.

5.1. Past

There is a clear barrier between the container and RoRo industry, that the origin of differences is started with their industrial origin. Container shipping industry appears relatively recently than RoRo industry to overcome cost barrier from the company to trade with internationally, and efficiently. The first appearance of the container is the 1950s, which is at least 50 years or thousands year if the concept of trailer expanded to “Road freight traffic”. However, RoRo industry is developed with traditional road freight traffic using a trailer, then sometimes even before the appearance of the automobile, therefore it is more customer friendly and required more reliability than container inevitably.

Increasing efficient global logistics during World War I & II and rapid growing stage for the Far East Asian countries, the wave of containerization are spillover all around the world, consequently, some Asian countries regional or local transportation of general cargo has relied on the container, not a trailer.

5.2. Present

As it is reviewed in the literature review and an interview, the trend of containerization is dominating in deep-sea transport in North Europe, however, there are some barriers prevent container cannot be dominant within North Europe market.
The technical barrier between container is trailer is obvious in North Europe market. As Woxenius and Bergqvist (2011) identified well in their research paper, those fundamental and unchanged differences still valid after getting feedback from the various interviewee, still RoRo trade volume in North Europe is more than twice in tonnes. Also, another reason identified with this research paper, that is the capacity and handling matter. To substitute trailer fully to the container, at least 45ft container is needed to load 33 palletized cargo unit. There is the various extended type of container are discussed in EILU by EU, however, still, it is not widely used. Another advantage of the trailer is the loading convenience, most commonly used dry-van trailer can be opened with side curtain, which enables them to load/unload parcel cargo with various point of delivery/loading efficiently and fast.

Also, it is different in the customer aspect too, most of the container shipping is originated from the deep sea customer which means Europe < Asia route. Due to the technical barrier and for the cost efficiency, container shipping is inevitable to be developed with infra/suprastructure basis. For example, once the container cargo arrived in the hub port, they are needed to be stored in the warehouse or yard at first, then they can be redistributed to the customer. However, with the cost aspect, using railway is logically right, and this factor will be a barrier to the small customer who doesn’t have flexibility in terms of volume and long transit time.
Recently arising trucker shortage issue is also the huge impact to the road freighter, however, they are trying to expand more trailer and trucker because there is no expected market movement that de-regulation of container carriage or container carrier’s movements.

In conclusion, by looking into the statistic data, interview with a different regional person, and self-researching, there is no significant trend that the transport mode is changed from RoRo to Container. It does not mean that this research is not denying or underestimating that there is an effort from the large customers such as IKEA or some RoRo operator who want to grow and dominant in the North Europe logistics market. However it is a clearly different market with different customer origin, therefore there is no significant expectation that the RoRo shipping market is diminishing in short/mid-term.
5.3. Future

Even the current barriers preventing the market intervene from the container to RoRo shipping, the fact is that containerization is still a valid trend, there are many types of research or industrial trial are being done. Also industrial aspect, there are various attempt is being done by companies, so in the future, it is undeniable that logistics trend will be different than the present one in the end. Already, there are various of events are expected to happen in the future logistics trend.

The Arctic route is one of the typical examples. Maersk Line is just initiated world first Arctic Route in 2018, and various report forecast that in 2030, more than 50% of the total season will be available to be navigated, and then 4~50% of container traffic will be moved to the Arctic route. Therefore, in the future, more container traffic can be transferred to the Arctic route, which means

Chinese OBOR initiative is now stuck from the Trade War and their financial difficulties, however, if Chinese continue and complete their investment successfully, large portion of container volume (relatively small to the deep sea, but large for short sea) network will be completed and some of North Sea container feeder will have benefit. However currently it is expected with a very low chance.
6. Discussion

The target market for container shipping and RoRo shipping is quite different. At the same time, their philosophy of backbone is also different. The container is targeting deep-sea cargo and RoRo is targeting short sea cargo mainly, and the one is cost-effective approach and another one is customer reliability approach. Therefore, only non-time sensitive cargo or customer who is large enough to control their own warehouse or bargaining power can adopt containerization to the regional level. Due to strong cabotage and anti-trust regulation, one of the main advantages of RoRo, time reliability, will not be broken by container short sea shipping. Because to achieve this, container shipping should have a massive fleet to operate more than daily service between two port pairs. This will incur the traffic cost in the end, even they achieve it, cost competitiveness should be reviewed. Technical differences also should be considered as an important factor. Due to the environment-friendly concept of container shipping connecting with railway system, the European Commission introduced EILU to the Europe market, however, the problem is those containers cannot be carried by full container ship properly. Therefore, in short, sea shipping customer, they have another choice as a transport mode, container consequently, however, the container is to be loaded only back door, and frequency of service is not competitive than RoRo. Therefore, most of existing RoRo customer will still choose RoRo shipping as their transport mode.

Even some regional RoRo company are contributing to the consolidation of container shipping to the RoRo shipping, the volume transported is still nothing comparing to the volume transported as the trailer. And due to the customer convenience, the recent trend in the market is increasing trailer equipment than container equipment. And some of container feeder container is introducing themselves as the door to door service provider to a regional customer, however, due to service reliability, the volume transfer from
RoRo to the container will be very limited. So, in the end, the main business area of container feeder company will remain as container feeder for global trade, and RoRo company will remain as strengthening their market position as most reliable sea transport mode just like Oresund bridge or Dover tunnel.

Although all present events and trend say that RoRo and container will develop with its own philosophy, a potential shock to the system to change the whole pattern should not be ignored. It is clear that combining container with railway is the less damaging environment, and there are various attempts to collapse the wall between the container and RoRo shipping. Because a large amount of research is being done in container shipping area to improve their service quality by adding various value such as vertical/horizontal consolidation, new route development, e-commerce, and even automation, RoRo shipping also should monitor their business competitiveness considering cost-efficient way too to develop a sustainable way of their own business.
7. Conclusion

As this research paper elaborated, the logistics trend spillover originated from the containerization in the 1950s is now arrived at the end of the market. The geographical and political circumstance in Europe boosted developing European short sea shipping, and now there is a movement that logistics trend from trailer to container with connecting environmental less damaging intermodal mode railway. The volume is increasing especially in Netherland and Belgium, however, two strong barriers are acting to prevent cargo transfer, that is the technological difference and philosophical difference. The container is not user-friendly for some customer due to the inconvenience of loading/discharging difficulties in multiple spots, and the necessity of a large volume of cargo. Also, incompatible railway gauge is preventing trailer volume connect to the railway. Currently, this volume transfer is limited especially to the customer which are capable to handle a large amount of volume so that they can manage their own warehouses in multiple spots, and railway infrastructure development is not simple in Europe because it is needed to pass multiple country border and customs. In industry also, the acknowledge of the railway as an efficient transport mode, but not as a reliable transport mode. Another mode of the philosophical barrier is also acting in a strong way. The origin of the container is cost-efficient, not a reliable transport (relatively than RoRo), and the presence of EU which prevent monopoly in the EU market, container shipping company is hard to gain enough competition to RoRo unless they expand more than 3, 4 times of their fleet than now. However, the fact that the trend is container cannot be ignored. There is a continuous effort from cargo customer side or container shipping company side to move more volume to the 45feet pallet wide container in EU. Netherlands and Belgium are good examples, and some industry view
expects that recent trucker shortage issue in Europe will accelerate the volume transfer from trailer to container sooner.

Therefore, in mid-long term business for the trailer will be still strong in the development of container volume at the specific port which has well-developed railway systems, in the longer term, they should acknowledge that the transport mode will more transfer from trailer to container and should also prepare their business way to improve more cost-efficient way. However, still, there will be a customer which needed higher reliable service at all time in North Europe, therefore RoRo shipping company should make their choice if they want to stay in their traditional market or participate in the new trend. In this way, it seems clear that DFDS and Cobelfret are focusing more on freight side to compatible with container transport, and Stena Line is sticking their position as pure carrier / 50% freight, 50% passenger concept. Whatever the choice, this choice will be effective until mid-long term, however, the whole trend is heading environmental friendly way and cost-efficient way, they should pursue their longer business model which include fleet consists and vessel construction considering those factors.

On the other hand, this research paper has two significant limitation factors, one is time limitation and other is data transparency. The research project was within a month, therefore most of the time was consumed to understand the industry itself. If there were more time, more various market research might be possible to improve the reliability of this research paper. Short sea shipping market is a bigger market in North Europe market, however, the data is not transparent. One of the reasons is RoRo shipping provide their service frequency in a various way, (minutely, quarter-minutely, hourly, twelve hourly…) therefore there is no optimum way to measure the supply capacity to the market. On the contrary container shipping provide mostly weekly service, the total sum of the whole fleet means weekly supply to the market.

And the research itself, the result is limited in some way because the approach was started from the shipping market. However, the result implicates the whole trend is not
primarily driven by the shipping company but the customer and the EU policy, if the same research topic is done focusing on primarily land intermodal trend and European internal commodity movement from each country to each country, other factors will be identified to identify the logistics trend measurement in North Europe comparing container and semi-trailer.
List of References


# Appendices

## Appendix I – List of data and source

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Appendix II – Interview Script

1) Interview 1 – A,B // Board Member

A: What is the development, and Cobelfret has their route of Rotterdam-Sea bridge -
directly to Dublin, if we can see the fact of the growth, somehow if we can find out
how much is container, how much is louvre shipments on that vessel.

Another interests is other operators, which has interests of the routes from
Rotterdam area and Zeebrugge area to create this short louvre vessel to UK

B: We, Stena Line has RoRo, RoPax, and few containers. What is the space between
container and RoRo, we can actually see on the commodity point of view that is
sliding scale more than two separate transport change, because of the commodity
point of view it has to do with lead time, etc, what triggers and what types of
transport you choose, right? For the container whether it is going to the ocean route or
to the European distribution point, it will be slower (than RoRo), but cheaper. (for
what method?) where you fill up instead truck, which means the price is relatively
low other than “trucking” however it is much expensive than “Container”. So, the
question is if there is a space between based on the development look like. For us,
Stena Line, it is different problem. We can feel that the differences between container
and roro are getting closer and closer, with lower cost to be fully loaded into
container. ( or question mark. Is that a development? ) If so, there is potential risk to
lose lowest paying volume (slowest moving goods into container instead of trailer). Is
it really happening or potentially to be happened, or just our fear from the industry
trend. And This was demand point of view.

From the supply point of view, the question is what does the container feeders do?
For example, Cobelfret started to build the vessel which can carry trailer and
container at the same time suddenly.

A: You can examine one of our most competitive competitor, P&O, at least in the
Irelands, they have been traditionally focused much much on the passenger and
louvre (like us). However, just 1 year before, they suddenly started Louvre service
from Zeebrugge to Hull. We were surprised, “why”. I assume one of the reason is that
they are seeing large volumes of containers which are coming from Fart East Asia,
and trying to gain some market beneficial from that. (continue)
Author: Do you think as another example, recently announce acquisition of Uni-feeder by DP world is also in line with this trend?

A: (continued) Absolutely. So, using trailer on the train is quite expensive and not fit to utilize the space and then you will have lots of claims from customer because trailer is more sensitive than “steel box (container)”. So the container is best alternative for the usage of “multi purpose loading box” we can have. I am afraid of this development. Because, we didn’t consider about this development so the fleet is not fit to carry double stack container. We don’t have enough height in the hold, strength of the hold, enough knowledge.

B: Exactly. With the development of containerization, you can also see the development of silk road carrying containers on the train. (continue)

Author: You mean, it is required to view whole picture of intermodal development not only limited to the container shipping?

B: (Continued) Yes. And especially, Europe to China or vice versa for example. Which the trade volume has been increased heavily over the period by train. Once the volume from China arrived whether in the inland distribution point or sea port, those volume should be carried by sea transport, which means container feeder, to re-distribute across whole Europe.

So, the question is, is there a room of the faster container lead time than trailer from the whole picture of logistics flow. Because lots of cargo from China by train also drops their cargo to the Med drop point, it is much faster to use train than waiting container vessel to move container from Med to North. Which means the necessity of feeder vessel will be increased in the North.

2) Interview 2 – C

Author: There is a statistic regarding trade volume between countries with container and RoRo including accompanied and unaccompanied each, I will compare those volume development with econometric tools to identify the fact if there is relationship between the volume change between container transport volume and RoRo volume.
Author: Yes, and it’s based on market perspective what’s going on and what’s happening etc.

C: One of the things the customer taking into account are, for rail traffic. When you use rail, you need to load onto rail fully roadded and to unload in a same way. That’s a clear downside. However when you use truck, you can perform multi-collection. Most of our customer usually send their trailer from A to B, then to C not back to A. That’s the one of the reason why the cargo cannot be transported by train some time. It also explains why there is not so much short sea container traffic.

Author: I took a look at the cargo trade volume data from Eurostats, and I found that especially, almost traffic in UK is actually RoRo not Container, which is almost none-traffic. And also some of RoRo shipping company like Cobelfret, they are expanding their portion from trailer to container. So, I can see that there is a movement from supplier.

C: Yes, and I can say, biggest factor is reliability, capacity, cost and frequency. And for the reliability, I think container shipping is more volatile because they often suspend service during off-season period. And also the price, I can say that our pricing is generally an year, containers are every month usually. That means also, we can utilize container when they are cheaper. And containers are need more infrastructure than trailer, so which gives more flexibility to trailer.

Author: So, I was wonder that from another interview, some of people actually worrying about the weakening of traditional competitiveness of RoRo shipping. Of course the traditional advantage means that the trailer can go different destination after unloaded, however, recently because the development of warehouses the weakness of container transport is being improved in some ways. And I saw from the statistic data that the total trade volume of container comparing to RoRo is still very small, however the growth rate is much faster than RoRo. In this point, I should identify more about the data because I cannot trust reliability of the data at this moment. Therefore, I need more RoRo shipping data to build up the background standard information for myself to assess the data reliability.

C: We can provide you data includes some variable, however particularly, the weight data is not accurate because we are depending on the customer’s data with 100 percent. On the other hand, other information including cargo type, volume can be provided with unit, (TBU)

3) Interview 3 – D
Author: Explain about himself and purpose of project

D: Interesting. Cuz, recently, there were some changes quite recently, with companies buying feeder companies to expand themselves, so I think it is good to take a look their market and how they operates to keep our business.

Author: Yes. What I am seeing on this whole logistics market is recently changing from traditional horizontal competition to vertical competition. For example, Maersk which is leading global logistics on the maritime sector dropped their oil business and announced that they will focus on their logistics department which include Maersk Line itself and some logistics parties containing terminal. Actually it is not initially started by Maersk but Amazon. In conclusion, the market is now on the horizontal vertical stage. This trend can be sighted widely in the maritime logistics sector, for example, CMA CGM took over CEVA logistics to enhance their core in logistics. Also, this trend were tried since some several years before as we can see also in Hanjin Shipping case, they had freight forwarding company too, and also had IT company which provide logistics system solution for them.

Because the origin of the cargo actually can be shared by container shipping and RoRo shipping, if the acceleration of market development continues in container shipping, I think RoRo shipping will be threatened by its competitiveness from the container shipping resulting the cargo share flows from RoRo to Container.

The one of the fundamental competitiveness of RoRo is reliability. They provide daily or even hourly service frequencies without delay most of the cases, and therefore they carry the customer’s cargo directly to them. That was the traditional strength of roro. However, there are views in RoRo shipping industry that those kind of strength are diminishing relatively. Because, more logistics parties locate or construct their ware houses near container hub port so they are reducing total transit time to the customer in the end, therefore the competitiveness is growing from container shipping.

D: I think in order to understand all the companies acting in North Sea, it can be a threat, but I cannot see that has no huge effect yet to us recently. When we heard the rumor of IKEA building huge places east Europe like Poland to support short sea container shipping with a lot of volume, of course they need enough infrastructure to handle that. It means once the product produced in the plant, they need to carry those products into container by rail direct to the near port to use short sea container service. But I think it may work for those kind of big customer however it will not
work for other general roro cargo. I can say that other RoRo shipping company is more threat to us than containerization yet.

Author: I also think that there is not overlapped area in terms of customer, however as you have both experience in container shipping and roro shipping right now, do you think there is clear differences of the customer structure?

E: First of all, maybe it is good to have a common view of who has historically using container or roro, for example, going back twenty years, Unifeeder was more like traditional container feeder company. The most cargo came from Asia, they went to hub port in EU first, Hamburg, Rotterdam, Antwerp. And then, they were re-distributed by feeder to Sweden, Denmark, or Finland. And then over time, that has changed. Because total volume kept increasing, direct call services are provided by Maersk, CMA CGM. However, if we look into the cargo for RoRo they are not like containers’. They are Europe produced cargo for European. To be compare with all the cargo comes by the container ship, they used to used feeder service, however they are using direct call nowadays for example Gothenburg, and then couple of years ago, they start to buying small container company to act as their own feeder network. For example, Maersk acquired Seago Line, what they mainly do is support their mother, Maersk, vessel. But with this business, they are taking some business from the RoRo vessel too. It was possible due to the standardized characteristic of container, you know, this equipment can carry any type of cargo even bulk or liquid cargo.

Anyway, the challenge is get a efficient cost and lead time. Having a truck with full load for a customer or partially loaded to distribute different customer, it needs similar procedure with container transportation.

Author: How about the structure of type of cargo for container and RoRo shipping? Is it also different.

D: Yes, I would say so. For example, the cargo from far east to North Europe like Sweden or Denmark are usually consumer goods, components, while the cargo from Europe to Europe is more production cargo for industry, building industry, automotive or machinery so on.

Author: So, you mean basically, the cargo for container is international cargo and then the cargo for the RoRo cargo is regional local cargo.

D: Roughly yes. But also you should consider that normally owning feeder company is valuable for global container shipping company let them able to provide their service cheaper with connecting those feeder network at cheap price. Same logic applies for road operator too, if they own road, their truck service will much cheaper so the will
not prefer to buy or use other trucks. If we look at the short sea container feeders network they have good network and its developing, so it maybe threat. However, you know to make a stowage plan for container vessel, the cargo must arrive before 8PM a day before, which mean the cargo will wait sometimes about a day even before container vessel arrives. So the big advantages of the RoRo is frequency and short waiting time once the cargo arrived in the port.

The main potential threat can be what if they increase their capacity to increase frequency enough to provide daily service, however this efforts still can be stayed with the problem of their network structure. RoRo service is generally A to B service, however container service has several port of calls. If they called Gothenburg, and the they will go other port and other port and other port then come back to Gothenburg.

Author: So transit time is absolutely not competitive than RoRo.

D: Yes. For examples, we have many ships deployed all over the North Europe, and they provide services with transit time few hours, frequency of hourly or in some minutes. And no container carrier can compete with this frequency and transit time. And container feeder company build up enough network and if they start to provide cheap price, very cheap price services, than general cargo can be shifted to the container cargo. But you cannot find any economy if you utilize container vessel from A to B only.

So also one of the problem is container is general trend of the whole market, industry are looking for the container as you see.

Author: In term of carriage volume, Stena Line is one of the biggest also DFDS and Cobelfret. And actually, most of RoRo shipping company in North Europe are regional operator not like Stena, DFDS and Cobelfret. For container feeder, there are large one Uni feeder, Xpress which is growing rapidly nowadays. So from the statistics, actually RoRo volume is more than double of container feeder volume in terms of tonnes.

Overall, from today’s discussion if the RoRo customer is separate with Container customer volume, RoRo volume will correlated to EU growth index like GDP and Container volume will be correlated to the development of oversea container volume. I will investigate further on this aspect and thank for your interview today.

D: Also there is cabotage issues which we should take a look at it too.

Author: Thanks for your interview today.
4) Interview 4 – E

E: we currently observe the movement from roro traffic to feeder traffic so called short sea shipping or some people simply say just intermodal. Typical example from our case is Poland -> Netherlands -> (ferry) -> Harwich or Killingholm (ikea, by trailer). What’s happening now is some of the feeder operator like Unifeeder recently bought by DP world, they offer not only container feeder service but also door to door service like from Poland to UK with several hundreds euro cheaper than our service meaning huge differences in pricing. That is attracting some of the big customer like IKEA having big flows of cargo.

The only problem and difference is even though they are providing same transit time frequency is much different right now, so whole time consumed in door to door is much greater than roro. IKEA products can be delivered to UK for example within 3~4 days, however container feeder cannot provide because they should wait at the port for the sea transport. Although there is a barrier with frequency, fundamentally the transportation cost has huge differences around 2~400 euros per unit, the big customer like IKEA which have big supply chain, they can afford another 2~3 days of transit time or even 2 weeks if it is provided with very low cost transportation. But it is limited to some product category of IKEA yet other type of product category is still sensitive. Also IKEA are trying to reduce about 80% of the volume to put them in the container.

Currently in the feeder market, big feeder player like Uni-feeder (DP World), Containerships, McAndrews, Seagoline (Maersk Line) which is problem for us because they carry Samsung products from Poland to Sweden or Siemans products are being problem for us. They are providing door to door service with pricing however big customer like IKEA who has enough bargaining power with container volume about some thousands TEU, they can get guarantee for example free 7 days demurrage in one port and another 7 days of free demurrage on the other port. Also it is similar for Samsung as another example. It is not for all cases but limited like some furniture products or house electronic equipment, anyway they are using the container as their warehouse without having any big warehouses near the production sites in Poland actually. So if we see the whole flows, they will transport by using container-rail transportation to the port, and then use container vessel with weekly frequency, once arrived in Sweden, they will send their container to the distribution center depending on the seasonal demand fluctuation. So, they are utilizing their bargaining power to use container storage in the port, we called it “travelling warehouse”.


On the other hand, using truck from Poland to Sweden will give you 24 hours or up to 48 hours depending on the destination, however it sometimes too fast for delivery if it goes long distance. Also currently EU are suffering the driver shortages, which contribute main reason to drive the increase of transportation cost, thus this pushes market seek another cheaper transport modes meaning container.

So in conclusion, we see two market trends. One is the container feeder operator like Uni-feeder, Containerships, McAndrews, and Seagoline are trying to build new logistics solution to provide efficient traffic to the customer, and another one is some of traditional customer is trying to use container by rental, leasing or borrowing from the owner which is typically container feeder operator ( and within some month they will own container equipment ), and then container feeder operator suddenly realized that their customer is using their service just as another intermodal mode to the shipper or consignee directly. So now they are advertising themselves as the door-to-door service provide. For example, in the conference few years ago, Uni-feeder introduced themselves just as door-to-door service provider with environmental friendly with using train, LNG powered vessel. And then surprisingly, some transportation company just moved their volume to them with simply believing that concept.

Author: And isn’t it valid for some customer will need higher frequency than container?

E: Yes. Some of customer still need to higher frequency for delivery, however at the same time the industry like automotive or fresh goods, they don’t use container feeder service because for example, once they produce some parts in Poland, they should deliver it in UK factory within 24 hours. So they use trucks with many drivers with only shut off truck on the roro vessel. The reason they use many drivers is EU regulate the truck drivers working our 9 hour per day maximum which is not enough to drive from Poland factory to Dutch port at one time. So what they are doing is they hire two drivers and change over the driver at some point during their journey just to legalize their business. And Samsung is using truck to deliver electronics to France for another example of using truck. However once they have white goods which means lower value cargo with high cubic meter with longer delivery time, then of course they will use container shipping for their transportation. However the container feeder company once they put their vessel typically size up to 2,000 TEUS, they will first approach big customer like IKEA to build door-to-door network by utilizing infra/suprastructure including railway from warehouses from production plants to the container ports, and then they will fix the price. Also it means that this mode is limited by the need of huge cargo to fill their vessel also lack of frequency. They need massive of containers to be loaded also those will be unloaded at the
discharging port, so customer also need massive inland traffic capability in a short time to deliver the cargo to the distribution point, which will cause surging of inland freight cost in short term. The problem in UK for example, first, they are suffering massive shortage of truck driver, and arising Brexit issue accelerate uncertainty of the market.

IKEA decided to change many distribution point from Poland to Switzerland, because the match of their production with the transportation. They are utilizing the carrier to carry their cargo, however, currently there is no carrier capable to carry their massive cargo produced. So, container industry is rely not only on the big customer but also railway infrastructure too. It is not easy to find or build up a circumstances with providing thousands truck drivers to the certain port, certain time and certain moment to deal with massive discharge volume from container vessel. Only in Poland, there are about 100,000 truck drivers available nowadays, and in another report says there are about 400,000 truck drivers with some missing statistic data nowadays.

Author: How about the customer structure of container feeder and RoRo industry? Is it restricted with customer exposure to the huge one like IKEA for RoRo industry?

E: No. We are involved significantly. My estimation from Poland to Sweden by IKEA using our service is more than 10,000 units. They have a solution with wagons for train, which connect to the Gydina port where our service is provided. But the train traffic for roro are decreasing because it is harder and harder to let rail operator due to the aspect of profit. Also other cargo are transferring in some way because of the expansion of container feeder company, for example, if you ask uni-feeder “what is your service” then they will reply if you are global container operator, “we are the largest feeder operator in EU. We provide efficient feeder service”, on the other hand, if you are general freight forwarder or logistics customer, they will say “we are same like traditional (roro) operator. We provide door to door service”.

And special feature of container type in EU is 45 feet container. Generally, container from oversea are dominant with the type of 40 ft high cube via OBOR (One Belt One Road) or global container network, however feeder company are trying to fully substitute from trailer to container and the reason why they use 45 ft high cube as substitute is that size of container can only load trailer’s capacity for example 33 palletized cargo at a same time.

Author: And I heard about the news that Seago Line will put 4,000 TEU into the north Europe network. I wonder how they will manage such a big size only in North Europe market.
E: It seems that they are utilizing and advancing hub and spoke system in the North Europe. At the similar time, Maersk will drop some of ports in North Europe and Seago Line will be the substitute for the present network. To enhance cost competitiveness and transit time, their mother vessel only will stop at big hub port and then the cargo will be redistributed by the feeder vessel. The reason behind is not clear to assess however, it seems clear that they want to optimize their cost. Also some of the hub ports are hiding their statistics for example, Hamburg, they don’t open their data how much volume goes to Poland, how much volume goes to Sweden, so on so forth.

Author: However, in Eurostat they have quarterly data results with the dimension of each reporting port to/from destination/origin country with tonnes or TEU or container volume. I will share you when I have visible data of it.

E: Ah, so it is possible to get the data. Thanks for sharing.

Author: I was also working in the Container network designing department, and few month before I visited Maersk Brokers and the department leader presented that because of the growing size of container vessel, calling ports for deep sea route will inevitably reduced and then finally the demand on the 4,5000 TEU vessel will be increased. I was surprised just within 2~3month, their subsidiary container feeder company Seago Line decided to put their 4,000 TEU container feeder into their service.

How about the Chinese OBOR initiative? Is it significant to the shipping industry that more cargo will be transferred to the railways? I saw the statistic from Eurostats that in 3 years, total railway volume has been increased more than 10 times. It’s growing very fast, and I understand that Chinese government will put total 1 trillion USD into that project.

E: Yes we see everyday the volume is increasing. Wherever you go in Poland you can see the warehouses to store container from rail, you can see plenty of train. Right now, it is stuck with infrastructure problem. For example, customer clearance require unload container on the border and reload after inspection, however just few month there was a conference and polish government and rail operator seems to positive with the infrastructure development, and yet now, it seem 40% more potential growing is contained. Overall it is clear that custom clearance is one of huge disturbance for OBOR. On some days, there was 50 trains were waiting for the custom clearance which need 3~7days train stop on the border.
Right now, bottleneck issue is solved in some ways, so yes. Unless Chinese government keep investing their money to this project this will be problem. This project is not economical naturally developed but artificially initiated by the need of Chinese government.

Also we are trying to utilize to create additional profit from OBOR, for example, container going form warsaw empty to Gdynia, empty to Sweden by using our vessel, and load paper there and then return to warsaw to be delivered back to China. The volume is very rare, I remember last volume was about 6 months ago, however we are keep promoting the customer to create additional value from OBOR.

Author: And there might be some uncertainty, one is total volume is still almost nothing comparison with container volume via Indian Ocean, and I saw from some article that Chinese government want to impose the total freight cost is about 10,000 $ per box. I wonder how this business model can be sustainable.

E: In the beginning 2,3 years ago, the price was like that, however nowadays it is about 2500 $ per box due to higher frequency (supply increase) and the reason of the cost differences were the imbalance. Consequently, thousands of empty containers were left in Europe, so it was sold to individual for opening like restaurant, coffee shop or other shop, cuz it was very cheap with one box around 4~500Euro.

Author: Thanks for you detailed response today, and as final question, how do you look overall the trend of container shipping and roro shipping and how roro shipping company should act to survive from this new market circumstance?

E: In my opinion, the pressure from the container feeder is existing, on the other hand, to survive in this circumstance, I think we should do our utmost effort to do our things. What we do is we deliver space and capacity for intra European trade, and we should monitor the behavior of container feeder company, however they are operating with very small margin, so I don’t think that they will take our position away. And fundamentally, it seems logical that we use cheap price of service, for example, from Asia to Europe is about 200 Euro however from Poland to Sweden more than 1,000 Euro. But, if you look into their philosophy behind, their goal is finally increase the size and kill all other middle size market. We are quite on the “side” market relatively, so what we need to do is just keep on our business but monitoring carefully about them, and we don’t need to be scared unless we are trying our best what we are doing.
5) Interview 5 – F

A: It is interesting to see the data of Ireland which shows relative decrease in terms of total transport volume, actually we had conversation this morning that recession of container traffic in Ireland so we are switching our volume to trailers, we are selling some containers to buy more tailers.

Author: Yes that’s what we should look into carefully. Total trade volume is actually increasing in Ireland, however statistics means that growth of container volume is relatively lessor than growth of RoRo volume. In this point of view, I heard that Europe, especially UK, are suffering severe driver shortages

A: Oh yes, that’s huge impact on North Europe nowadays. It is getting harder and harder to find drivers nowadays, therefore finally that is why trailer volume are moving from accompanied to unaccompanied nowadays. If you look our company’s business, we are not the company who provide direct service from Rossale Harbour to Cherbourg, however we provide carriage service and the company like us are switching their volume to unaccompanied. I can say that driver shortage is one of the single biggest issues for Transport company in North Europe nowadays. Anyhow, therefore your statistic with analysis that container volume is dropping in Ireland is interesting.

Author: So, you think major factors that the trend load unit transfer from accompanied to unaccompanied is “Driver”

A: Absolutely. Driver is biggest issue.

Author: I saw an article that road freight rate is hiking historically due to the shortage of drivers, and nowadays it is even higher than just before the global crisis.

A: Oh yeah, we’ve increased our driver’s wage twice only in this year.

Author: Twice in a year??

A: Yes, correct. Twice. That’s just the cost we should bear just to get the drivers from the market. Because if I want to get the freight (Customer), I need to hire more drivers.

Author: I heard one of my customers in England, paying 500 british pounds bonus to the drivers, just let them stay until the new year for the existing drivers.

A: Right. So, we, at the moment, bringing 16 drivers from South Africa last October. Additional 16 will come in two weeks, and another 10 will come in January. This is the only way to get the drivers at this moment. They speak English, the drivers are
same size like us. You can’t get Polish drivers, they all work within Germany and Poland where they can get enough money. So we are heading toward the cliff very very quickly here. Unless we solve the driver situation, we will be fallen. It will potentially impact on the trade volume, because nobody will want to carry cargo with such a high cost.

Author: And one of my concerns is, if this driver shortage continues or worsen, that will impact on the logistics market for their choice of load unit. For example, trend flow from accompanied to unaccompanied, and then finally containers in the end. How do you think?

A: There is no difference in container and trailer in short sea shipping. The only differences are in deep sea. In short sea shipping, trailers are more user friendly, they can be opened from side door, back door. On the other hand, containers are cheaper and stackable. The problem with container is, the service transit time is exactly with trailer nowadays, so in some way the container are expanding more intra-territory, however the commodity type to be transported is not fitted with container. Therefore, people are massively switching over their containers to the unaccompanied trailer.

Author: You mean they are changing their business from Container to trailer in Irlend?

A: Not only in Ireland but in Europe. Look at Cobelfret. I had a conversation with Cobelfret, they are buying trailers all the time. That’s where the market going. Couple of weeks ago they lunched 8,000 lanes meters slim RoRo vessel in Dublin to Antwerp, and second sister ship will lunch in next month at Zeebrugge. They can carry double stack container mafi, hundreds of trailer, trucks, machinery, anything. It is really ConLo vessel.

Author: So, You mean it does not mean they are increasing their focus on container.

A: No. Decreasing container and increasing trailer. They are buying trailers all the time. We call that vessel “Brexit bolster”. Because they goes directly from Ireland, around UK, and then Rotterdam and Zeebrugge with carrying containers and trailers. Two largest container operator in Ireland closed down their business. More companies operating containers are closing down in September.

If you look at the container business deeply, you will realize it is more appropriate with deep sea trade. Look at EUCON, Samskip, and DFDS. EUCON is LoLo operators. You have to book containers. Samskip is approximately half to half between container and trailer. But Cobelfret and Stena Line are trailer operator, that’s what you do, that’s where the business is. More quicker, more frequency with services.
Anyway, finally, container business is dropping in Ireland, that was interesting. And what happened in Estonia?

Author: This is what I talked about, the data in Eurostat is a sample not a precise 100% reliable data in a piece, so if 1% of missing data as a whole do not affect the results, but if we divide data and try to look into more detail, it is huge if some missing data is focused in specific area. That’s what happened in Estonia. So, you can just take a look after that data disturbance.

A: How about Belgium?

Author: Belgium is absolutely decreasing relatively its RoRo business, that’s because they are directly owns big container hub, so total volume in RoRo and container are actually increasing however the growth rate is not faster than container.

A: I also interested in France. There is no driver companies in France. So most of traffic should be unaccompanied but it is not actually.

Author: I assume this figure includes Calais. Most of traffic in Calais is done by accompanied trailer, I assume that’s why.

Author: And also the statistic of Poland is significant. They have grown almost 8 times of trade volume since 2000, that’s because Poland become the plants of Europe. Recently lots of big companies built their producing plants in Poland due to cheap labor price.

A: Actually we have a office in Poland with owning truck company. And couple of weeks ago, they heard maybe IKEA or Mercedes are building their plants which will hire about 3~4,000 workers. Such a size required incurring infra/supra-structure to accommodate them.

Author: Interesting point is, container volume is increasing, because even they build a plant which will increase EU regional volume, however well invested railway infrastructure let the volume can be transported within containers

A: Those railway connections arrive in Rotterdam and Zeebrugge for deep sea, too. So, there are lots of container equipment market increase in Poland too.

Author: Second statistical result is trade volume from North Europe to North Europe. RoRo shipping is dominant in Europe region, however container volume is increasing faster than RoRo volume. However, we should separately recognize this figure because container volume means the volume coming from deep sea usually and some activity happening in Poland are boosting the container
volume, so that is also one of the reason. In conclusion, RoRo shipping is dominant in most North Europe area, however the country which have container hub port is still dominant by container traffic due to the feeder network.

Finally, all of above statistics is historical data, therefore, we can see the trend of past and present. However, to see future trend, we should assess and add other factors like cabotage which will prevent appearance of single biggest container feeder company in Europe, Arctic Sea where some research paper forecast fully opening their route by 2030, Silk Road, Trade war, logistics trend, Brexit, and others.

So, those are the researches what I am done to know the past, current and future trend, before begin the question, is it possible to share your company’s container & trailer traffic data to compare volume change of those two modes past five year.

A: No problem.

Question 1: From the previous research of Woxenius and Bergqvist in 2011, there is a table comparing container and trailer which provided in my presentation. Do you have any idea to update this table.

A: Yes, most of them are correct, however, we should consider more detail in different equipment. For example, 40ft and 20ft is most dominant in deep sea container shipping, however, most of traffic in short sea shipping is carried by 45ft pallet-wide container. Width of deep sea container is normally about 2.4 meters, however pallet-wide container is about 2.5 meters which is slightly bigger. In terms of capacity and flexibility 40ft container widely using is deep sea container market is not effective in RoRo shipping.

Author: So, nowadays fully cellular container vessel is actually not fit for carrying 45ft container. They will kill the spaces for the stowages.

A: So the feeder vessel are mixed with 20, 40, and 45ft containers. 20, 40ft containers are actually for deep sea connections and 45ft container are some cargoes within Europe. For example, Hapaq Lloyd has business in Ireland, so they want feeder vessels connect Ireland to Rotterdam, EUCON vessels are already in, X-press are
Author: It is interesting that the containerization appeared with standardization, however it goes different in Europe.

Question 2: I think we discussed about this question already, the question is, due to the overall trucker shortage in EU, road freight is skyrocketing recently, especially in UK. What’s the impact on your business and are there any impact on the customer’s load unit choice?

A: They are paying more, and transferring to unaccompanied cargo. Because the rate we are imposing to the customer includes those factors. So nowadays happening massive driver wage inflation, we are simply passing to our customer.

There are two huge impact. One is due to trucker shortage, I cannot guarantee that there will be road traffic everyday, consequently there will be unreliable transit time. Another impact is service provider’s power is increasing.

This morning we had a conversation with a guy who want to cut the freight rate from us because they want to pay lower freight, however, we are transport company, at the same time we are profit making company. So the point is, if the trucker situation continues, customer might try to find some solution, however, in the end, we will pick a customer with best rates. And the customer may have to live with the choices as we want. In conclusion, mostly the customer will bear inconvenience caused by trucker shortage like high cost, increased lead time.

Question 3: With the investment on railway under Chinese OBOR system deliver massive containers from China to Western country. Although recently, OBOR is detained due to the US trade war, exit of Kazakhstan, and Pakistan’s economic difficulty (Surrounding countries were too unstable to invest from the beginning of the project), the fact is that during last 3 years from 2014 to 2017, the traffic volume has been increased from few to more than 10 times (from Eurostats source)

Are there any customer reaction or market movement to the development of the OBOR?

A: Actually, we are not dealing with deep sea cargo much, I cannot imagine how much impact will be possibly incurred. However we sometimes see that there are massive cargo are coming from China by the railway to Rotterdam with lots of delays. So we
have to pick them up in the trailer sometimes. However, we don’t see any visible effects from that source, because we are engaged in intra-Europe trade mostly.

Author: Alright, very limited.

Question 4: Any recent movement from the big player which have huge volume but also your customer, if they are trying to change their volume from RoRo to container, if yes, how they are doing, if no, are there any reason behind?

A: One of our biggest customer which have timer to make furniture, they had issue with the size of container and trailer. Recently they built a plant with investing 16millino Euro in Walford, and started to produce different sizes of cargo. Because their unit size of product are not fit to load back door of container, they are actually transferring massive cargo to the container. For example, they have 3 meters length cargo, however it is not efficient using container back door to load it. Trailer is perfect with side door opened. Particularly, we have multi-locking point trailer, which means you can lock the post at side in different positions. So it is much easier than using container. Finally, in European market, it is different game. We want different types of cargo, so even DFDS or Cobelfret, that’s why they are increasing trailers.

Author: And there is a size restriction regulated by EU. How do you think about this

A: Yes the point is even there is EU regulation, each domestic regulation for the size limitation is different through the each individual country. Therefore, you cannot just keep same size of trailer to use all region.

Question 5: Operator like DFDS or Cobelfret, they are expanding their capacity to carry more container than RoRo. Especially, Cobelfret built new ship which can carry both of RoRo and Container at the same time. Under Perennial’s view, how do you expect and react those trend of RoRo carrier’s movement?

A: Those company are building vessel can carry container and trailer at the same time, however, it does not mean that they are expanding container volume. I don’t think they are carrying more containers than trailer, but my impression from them is they are actually increasing their business in trailer.

And they actually put their containers on the mafi and then roll on it. We are Cobelfret’s biggest customer in Rotterdam – Dublin and Zeebrugge – Dublin route. How we are doing on this trend and their behavior? We will just buy more
equipments. Cobelfret have old trucks. I think they are worst situation than us. They are depending on hauliers and workers to transport their equipment. Cobelfret and DFDS have vessels and equipment, they don’t have tailored drivers. Cobelfret is already mess around in France. What they are doing is they hire haulier from Belgium to Lion, and transship the goods there, because Belgium driver won’t go to France or Italy. Also they do carry to Zeebrugge by container and hire French haulier to transship the cargo from container to trailer. This is big problem. They cannot get drivers.

In this aspect, we are in very good positions because we have drivers. So we dictate our own operations. However DFDS and Cobelfret will suffer a lot. Cobelfret are more focused on container traffic, but DFDS isn’t. Recently DFDS lost large accounts. So we might compete with Cobelfret on trailers, however they are not strong in Holland but Germany. The reason why they are strong there is, because of the Polish drivers. Polish drivers can travel between Germany and Poland, however they don’t travel to Holland or Belgium. On the other hand, we have our own trucks and drivers in Rotterdam and Zeebrugge.

Also there is a problem with Cabotage, however, we have different supportive transport companies working in Belgium. Therefore, we can abide by Cabotage rule. Also our truck travels for example from Belgium to France, it is okay. However they have problem with sub-contractor. They use Romanian trucker to load/unload in Belgium. That’s cabotage. Not only the driver shortage itself is whole issue. The whole regulation governing this are getting more complex. For example, from 2019, new regulation for the truck will be implemented, we can basically track each truck with this rule. If you have Polish drivers working in Belgium, you should pay with Belgium wages. With this technology, truck movement will be very transparent, therefore if trucker stays some place longer time, they will be paid with higher wages.

5) Interview 6 – G*

*This interview is done 1 day before finalization of the research, therefore brief summary of interview will be presented only.
- ECS are leading 45FT pallet wide container company in the market, they are positioning themselves as a competitor of Container short sea operator (SAMSKIP, EUCON...), and other short sea container freight forwarder, and also semi-trailer freight forwarder. They purely focusing on short sea shipping with 45 feet palletwide container equipment.

- Container ship operator are divided in two groups, one is deep sea feeder (Uni feeder, Containerships, Seago Line.. ) and short sea operator (Samskip, Eucon.. etc)

- European Infrastructure are not well efficient in terms of reliability (like due to border inspection), but overall it is growing. It takes only about 5 days from Zeebrugge to Turkey by train.

- For Cobelfret, some major route such as Zeebrugge - UK or Rotterdam - UK, about 50% is pallet wide container and 50% is trailer.

- Trailer nowadays, starting from about 5 years before, can be easily transported by train especially in central Europe, by using P400 wagon. And the volume is increasing very fast. They consider that factor as their threat.

- They consider trucker situation as opportunity (for the cargo transfer from trailer to container). But nothing is visible (but he think it is imminent).

- Main commodity stream for them is Foodstuff, large customer for them is Nestle, Cannon, some alcohol company,

- They think recent consolidation happening in Container shipping market is only for the deep sea cargo (feeder) company, not their area.

- They think RoRo are now in the trend of Economy of scale led by Cobelfret, DFDS.

- They confirmed my finding is correct that mostly, large volume customer are considering the pallet wide container.

- They expect more unaccompanied cargo for Ireland/UK-Callas after Brexit.