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Development of the Ferry and Ro-Ro Industry in an Uncertain Environment

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Abstract:

Purpose: *The prime objective of the article is to analyse and demonstrate the importance of ferry and ro-ro services as essential links in regional supply chains in the Baltic Sea Region. The detailed objective is to analyse the activities of the operators in selected markets in the face of the necessity to adapt to changing external drivers.*
Design/Methodology/Approach: *To accomplish the objectives, the following research methods were used, literature review, desk research and in-depth analysis. The author conducted also in-depth interviews. Desk research and in-depth analysis were based on the data collected from the ShipPax Information and operators reports. The interviews were carried out with three shipowners, two of them are ferry companies, the latter operates ferries and pure roros.*
Findings: *Research revealed lack of current publications on ferry and ro-ro business activity in the context of dynamic and changing factors influencing the ferry affecting operators during last four years.*
Practical Implications: *The article emphasizes that there are so many factors that can potentially driver or derail the performance of the ferry industry, at the moment incertitude and caution are the two foremost considerations guiding the forecast. Economic reality will ultimately be the prime factor in the performance of the ferry and ro-ro industry. Current incertitude in the global economic outlook and all its discontents, such as inflation, oil prices and consumer good prices post a threat to the sector*
Originality/Value: *The literature researching the ferry shipping is not extensive, it includes a relatively small number of scientific articles. Most of the research concerns the years before COVID-2019 pandemic which has become the first of negative factors. There are few current studies on the functioning of the ferry and ro-ro sectors, the activity of which for the last four years has been significantly impacted by changes that occurred in the external environment. The article fills the research gap in the ferry and ro-ro sector studies.*

Keywords: *Baltic Sea Region, ferry shipping, drivers influencing the ferry operation, risks, maritime accidents.*

JEL classification: *M21, L99, L83, C38.*

Paper Type: *Research article.*

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1. Introduction

Demand for maritime transport services is derived from foreign trade turnover. The countries in the Baltic region are distinguished by mutual strong economic and trade links (Laaser and Schrader, 2017). In addition to several other factors, the intensity of international trade flows is significantly influenced by transportation costs and consequently by distance (Purju and Branten, 2013).

Steady growth in trade between the countries located in continental Europe and Scandinavia, as well as mutual exchange between the Nordic countries has been observed for last two decades. Trade in the region has shown significant growth since the accession of Poland and the Baltic States to the European Union and is estimated to have increase by an average of 10% year on year.

However, macro-economic changes and other shocks caused temporary decline in turnover. An example was the economic crisis in 2009, when exchanges dropped by 25%. A similar situation occurred in 2020 due to the Covid pandemic.

Trade between the Baltic countries is largely dominated by processed industrial goods and semi-finished products. Exports to the Nordic countries are dominated by commodities such as machinery and equipment, the automotive, furniture and household products. A significant share is also represented by the chemical and metallurgical industry products. Another group comprises agricultural goods and foodstuffs. The chief products imported from Sweden and Finland to continental European countries comprise wood and products of the forest and paper industry. The others are agricultural commodities and foodstuffs.

The mutual turnover between the continental countries and Scandinavia is imbalanced. The volume of exports to Sweden, Finland, Norway and Denmark from most continental countries exceeds imports. However, commercial relations as well as the size and structure of the international exchange determine cargo flows in the region.

Commodities between the countries in the region are primarily transported by vessels. In regional Baltic transport chains ferry transport predominate. Ferries and cargo ro-ros transport about 80% of the total internal trade volumes in BSR (Serry, 2014).

Ferry shipping is a type of liner trade, where passengers and cargo form one market transform in the other. Both segments are carried by one ship and ferries operate the regular routes (Urbanyi, 2021). Ferries transport people, goods and vehicles over short distances by sea (Stopford, 2009). Pure ro-ro ships carry only cargo, however some are equipped with accommodation up to 12 drivers. These vessels use ro-ro technology, so are equipped with car-decks for transportation and ramps for loading

operations of diverse wheeled cargo units comprising trucks, trailers, semitrailers and cargo stow on roll-trailers and cassettes.

The commodities are usually loaded into lorries or semitrailers in sender premises and unloaded in receiver places. The ferry services are marine links in door to door system. Ferry and ro-ro connections are elements of road - sea transport system between continental Europe and the Nordic countries (Musso *et al*., 2010). Ferry shipping constitutes prime link of the regional transport chains and multimodal transport systems (Paixao Casaca and Marlow, 2009; Daduna *et al.*, 2012, Urbanyi-Popiołek, 2018, Musso *et al*., 2010).

As the ferry services connect the continental Europe transport system with Scandinavian roads, ferries enables efficient and effective transport of goods carry in lorries and trucks from continental Europe to Scandinavia, Finland and Baltic States (Urbanyi-Popiołek, 2020).

Passenger transport is the second segment of ferry industry and is usually analysed in terms of tourism functions of ferry shipping (Wild and Dearing, 2010, Kizielewicz and Urbanyi-Popiołek, 2015, Pantouvakis, 2007). The passenger demand is created by people travelling in different purposes, e.g., visit a selected destination, holidays trips where the ferry is part of the journey, participation in package trips, shopping or business. However this segment is beyond the scope of the article.

2. Methodology

The literature researching the issue ferry business is scare and comprises a relatively small number of scientific articles and monographs. Most of the research concerns the last decade, before pandemic. There is a lack of actual research on the cargo sector, which is sensitive to changes in the environment. On the opposite there is sufficient research on maritime accidents and the impact of corporate governance in the cost of capital in shipping (e.g., Zampeta and Chondrokoukis, 2022; 2023a; 2023b; Zampeta, 2015; Thalassinos *et al.*, 2016).

The operation in the last four years has been significantly influenced by changes in the environment. Firstly the COVID-19 pandemic has resulted in a decline in economic activity, determined by a lockdown and broken regional supply chains, which in turn resulted in a decrease in the demand for cargo transport in the Baltic Sea Region. The war in Ukraine comes as another shock. The next drivers are slowdown in economic activity, inflation as well as increase in prices of fuels, raw materials and foodstuffs.

The prime objective of the article is to analyse and demonstrate the importance of ferry and ro-ro services as essential links in regional supply chains in the Baltic Sea

Region. The detailed objective is to analyse the activities of the operators in selected markets in the face of the necessity to adapt to changing external drivers.
In order to achieve the objectives, the following research questions have been formulated:

RQ1: What are the main drivers determining the demand for freight transport by ferry in changing contemporary external environment?

RQ2: What measures are being taken by operators to increase the efficiency of the maritime link in the regional supply chains?

To accomplish the objectives, the following research methods were used, literature review, desk research and in-depth analysis. The author conducted also in-depth interviews. The literature on ferry shipping, as stated is very limited and the review was carried out in the introduction section.

Desk research and in-depth analysis were based on the data collected from the ShipPax Information, a publisher of ferry and ro-ro reports, as well as from year and interim half year reports of the shipping companies. The interviews were carried out with three shipowners, two of them are ferry companies, the latter operates ferries and pure roros. The results of the interviews are presented in discussion section. The aim of the study is to fill a gap in the research on Baltic shipping in a changing environment.

3. Data Analysis

The fleet of vessels designed to carry wheeled cargo comprises ro-pax ferries and ro-ro cargo vessels. The size and capacity of analysed segment has been rising for last decade, while the number of operators and services is stable. According to available data, 18 ferry carriers operate international routes and the main cabotage lines, the latter important for international freight transport. The ship owners operate 110 ferries of various types - ro-pax and ro-cruise. More over 6 companies operate pure ro-ros (ShipaxMarket23, 2023). Table 1 presents the the major companies.

Table 1. *Basic data of the selected ferry operators.*

	2016		**2022**		**2023**	
Operator	**No. of ships**	**Line metre (m)**	**No. of ships**	**Line metre (m)**	**No. of ships**	**Line metre (m)**
Finnlines	7	25 878	8	30 274	9	35 747
Stena Line	17	36 869	17	42 086	14	38 776
DFDS	9	16 991	7	20 924	6	18 531
Tallink	11	17 483	10	20 635	8	15 900
TT-Line	6	14 454	8	21 250	9	25 250
Unity Line	7	11 923	7	12 420	7	12 420

Source: *Own elaboration based on ShippaxMarket 17, Shippa Market 22, Shippa Market 23.*

Finnlines has remained the largest ro-ro tonnage operator for years. The company operates 22 vessels including 8 ro-pax ferries and 14 cargo vessels. The latter not included in the table 1. Last year it increased its capacity by 25%, driven by the introduction of three large ro-ro vessels Finneco I, Finneco II and Finneco III, each with a cargo line of 5,800m. In July this year the first of two new Super Star-class ro-pax Finnscopus was handed over by China's Merchants Jinling Shipyard in Weihai. The ship's cargo line length is 5,200 m.

The ferry lines are as follows: Helsinki - Travemunde, Malmoe - Travemunde (Nordo Link) and Naantali - Kapellskar (Finn Link). The others are ro-ro cargo ships serving intra-Baltic lines (e.g. Hanko - Rostock, Turku - Travemunde, Helsinki/Turku - Aarhus, Hanko - Gdynia) as well as services to North Sea ports (e.g. Antwerp, Zeebrugge, Hull), the Bay of Biscay (Bilbao) and Ireland (Finnlines Annual Report, 2022).

The Baltic market leader in ferry segment has been Stena Lina for last 10 years. The shipowner has fourteen active ro-pax ferries of various sizes, most of them with a load line of over 2,200 metres, including six with a line of over 3,200 metres. The ships operate 6 services, Gdynia – Karlskrona, Kiel – Venspils, Klaipeda – Karlshamn and Goteborg – Kiel among others.

The third of the big three is Germany's TT-Line, whose potential has increased by more than 75% in recent three years. The company also runs large ferries with a load line of 2,200 to 4,000 metres. The shipowner`s network includes the following routes: Travemunde - Trelleborg, Rostock - Trelleborg, Swinoujscie - Trelleborg, Trelleborg - Karlshamn - Klaipeda. The port of Karlshamn was added to the network in spring this year.

Polish Unity Line operates two services Świnoujście – Ystad and Świnoujście – Trelleborg with seven smaller ships of load line up to 2,200 metres.

The largest network of lines is located on the Germany-Sweden corridor, where six services operate. The connections in the western part of the axis, between Travemunde and Trelleborg (TT-Line), Travemunde and Malmo (NordoLink) as well as Kiel and Gothenburg (Stena Line), mainly serve freight from the western Germany, as well as goods in transit from France, the Netherlands and - partially - from Switzerland, northern Italy and Spain to Scandinavia and vice versa.

In the case of countries such as the Netherlands, Belgium and the countries of south-western Europe, competition for these services comes from ro-ro cargo shipping and container shipping within the framework of the short sea shipping concept.

Another market comprises services between Germany and Denmark. The Puttgarden - Rodby line is also located in the western part of the Balic Sea and is the shortest ferry connection between Germany and Denmark for freight originating from these

countries. It is also a convenient route for customers from the western part of Europe towards Scandinavia using the fixed crossing in the Sound - Oresundbroen (Copenhagen - Malmo), as well as the Helsingor - Helsingborg line to Sweden or services from Jutland to Norway.

There is a well-developed network in the central Baltic, including connections from Poland and Lithuania to Sweden, among others from Swinoujscie to Trelleborg and Ystad, Gdynia to Karlskrona and Klaipeda to Karlshamn. Lines from Polish ports are mainly used by hauliers and forwarders from Poland, the Czech Republic, Slovakia, Hungary and other countries of Central Europe and the Balkans.

All these routes run along a south-north axis. In addition, there are east-west services on the Baltic, long-distance routes from Finland, Latvia and Lithuania to Germany. Ferry services in the triangle between Finland and Sweden and Estonia are well developed as well. The network comprises eight services, most operated in parallel by two operators. Table 2 shows the development of cargo turnover in selected markets.

Table 2. *Cargo traffic on the selected Baltic corridors.*

Market	**2019**	**2020**	**2021**	**2022**
Germany - Denmark	679,036	641,398	719,990	1,386,671
Germany - Sweden	814,150	794,356	890,416	853,000
Poland - Sweden	825,044	778,399	864,451	866,901
Germany - Finland	738,000	723,000	785,000	750,000
Lithuania - Sweden	84,142	94,797	95,021	46,000
Finland - Estonia	342,142	298,481	349,603	425,376

Source: *Own elaboration based on ShippaxMarket 20, ShippaxMarket 21, ShippaxMarket 22, ShippaxMarket 23.*

4. Discussion

Ro-ro freight traffic in the Baltic Sea region remains strongly influenced by the external environment with multiple drivers affect the operation of the ferry and ro-ro industry. The environment has been turbulent over the past five years, with unforeseen developments having a significant impact on turnover.

The first negative factor was the outbreak of the pandemic COVID-19. All countries in the Baltic Sea Region had taken far-reaching measures which had directly influenced the ferry business. Borders were closed and the Baltic states introduced entry restrictions.

The COVID-19 pandemic initiated a slowdown in economic activity, determined by lockdowns and broken supply chains. This caused supply disruptions, reduced production and consumption. While ferry lines are part of regional supply chains,

the effects of the shock were also felt by ferry services recording the declines in turnover.

The new situation has strongly affected the sector, cargo transportation dropped of 15-20% in numbers of trailers in 2020 YoY. The biggest falls affected services between Germany and Sweden as well as Finland and Estonia. The following year brought, as presented, in Table 2, increased demand reported by customers. Furthermore the business has been affected by rampant inflation, high fuel costs and a war in Ukraine.

The sanctions imposed on Russia and Belarus have had a huge impact on international trade globally. The effects are shortages of food products, raw materials and production components, once again disrupted supply chains. Significant price increases affect international supply chains and markets. The result is higher inflation rates in European countries. This can result in changes in demand as consumers are unwilling or unable to buy what they would normally buy.

Macroeconomic development, including the GDP and inflation, plays a significant role in the activity of the ferry business. It was predicted than in the eurozone countries the GDP would decline in late 2022 and in 2023 as households and businesses contend with soaring energy bills and potential energy disruptions (Reinikainen, 2022).

In February 2023 the European Commission published new European Economic Forecast. It predicts the GDP of the 27-member state bloc to grow by 0,8% in 2023. The figure is more promising, however the prediction is below the 1,5% increase that the Commission had forecast in summer 2022 (Reinikainen, 2023). In the European Union states, consumer confidence had recovered briefly to pre-pandemic levels in 2021.

Then war in Ukraine in 2022 attack sent it to levels unprecedented even in the immediate aftermath of a pandemic outbreak. However in fall 2023 the consumer confidence has started to improve. The increase in the index is related to the decrease in inflation, previously caused by energy and food prices. Ro-ro vessels mainly transport finished products and components, as well as foodstuff, so the consumer markets are chief for the business.

The Germany – Finland market is an example of routes affected by the conflict. Finnlines, the Helsinki based operator, in 2022 recorded a 20% decline in turnover YoY. A similar trend continues in the current year (Finnlines Financial Review Q3, 2023). In the months of January to July, approximately 356,000 freight units were transported, some 10% less than in the same period last year.

A similar trend is reported by Denmark's DFDS. The 2022 figures of the company`s freight volumes in the Baltic Sea showed 15% decline YoY (DFDS Annual Report,

2022). DFDS operates three services in the region: Klaipeda – Karlshamn, Klaipeda – Kiel and Paldiski – Kapellskar.

There are all east – west trades and both operates underline that the war has an impact on the traffic. On the connections from Germany to Klaipeda and Riga, transit goods were carried to Russia and Belarus.

The lack of these cargoes resulted in the presented drop in turnover. In contrast, the services in the south – north axes are far less affected by the war as those cross the Baltic Sea in east – west direction.

However, services from Germany and Poland did not see any increase in volume, which in turn is due to the decrease in traffic from mainland Europe to Sweden.

The presented conditions pose challenges to the shipowners and the necessity to adapt to the turbulent and unpredictable environment. The companies are forced to undertake actions to minimalize the negative effects influencing the fleet operation. On connections that have been affected by traffic drops, the frequency of departures has been reduced. These measures have been taken primarily on the lines from Germany and Sweden to Lithuania and Latvia.

The other activity is the cost management. Fuel prices are the most significant. High fuel prices have been the major driver for the ferry industry since Ukraine – Russia conflict has started. The fuel costs in 2023 account for 70% of companies` operating expenses, compared to 40% of the costs before the war.

Moreover the freight surcharges to basic rates went up. Shipowners raised the bunker surcharge (BAF) and low sulphur charge (LSC) by approximately 5% the most due to fuels prices. Another fees charge by the ferry companies are currency adjustment factor (CAF) and operational cost recovery (OCR). The latter has recently been introduced to compensate for other operating costs.

Ferry companies operating in the Baltic Sea Region need strong flows of freight, as the dominating operators have introduced very large ro-paxes lately. The biggest are Finnlines` Finnsirius and Finnscopus of 5,200 line metre each – the latter will enter service in January 2024.

Two new DFDS ships Aura Seaways and Luna Seaways has capacity of 4,500 line metre, while both TT-Line newbuildings Peter Pan and Nils Holgersson are of 4,000 line metre. Slightly smaller are the Stena Line units (Stena Ebba and Stena Estelle), each with a load line of 3,600 metres.

Economies of scale is the trend of ferry industry in the Baltic. However the ports have to generate sufficient volumes to justify the use of large vessels and benefit from economies of scale.

5. Conclusions

Trade relations between Continental Europe and Nordic countries are prime factors for cargo transport in the region. Ferry and ro-ro routes are prime solutions of servicing cargo flows in the BSR. However the business is highly dependent on external factors beyond the carriers` ability to influence the market.

While there are so many factors that can potentially driver or derail the performance of the ferry industry, at the moment incertitude and caution are the two foremost considerations guiding the forecast. Economic reality will ultimately be the prime factor in the performance of the ferry and ro-ro industry. Current incertitude in the global economic outlook and all its discontents, such as inflation, oil prices and consumer good prices post a threat to the sector.

On the whole, most indicators suggest that the ferry and ro-ro industry will star to recover, the pace of which is determined by the demand. In the first half 2023, the perspective for European economy seems to be improving, so in this scenario ferry shipping should continue to improve its performance in upcoming years.

References:

Daduna, J.R., Hunke, K., Prause, G. 2012. Analysis of Short Sea Shipping- Based Logistics Corridors in the Baltic Sea Region. Journal of Shipping and Ocean Engineering, 2, 304-319.

DFDS Annual Report 2022. 2023. www. Dfds.com.

Finnlines Annual Report 2022. 2023. www.finnlies.com.

Finnlines Financial Review Q3, 2023. www.finnlies.com.

Kizielewicz, J., Urbanyi-Popiołek, I. 2015. Rynek usług morskiej żeglugi wycieczkowej. Warszawa. PWN.

Laaser, C.F., Schrader, K. 2017. International trade in the Baltic Sea Region. K. Liuhto (Eds.). The economic state of the Baltic Sea Region. Turku, Centrum Balticum Foundation.

Musso, E., Paixao Casaca, A.C., Lynce, A.R. 2010. Economics of Short Sea Shipping. C. Grammenos (Eds.). The Handbook of Maritime Economics and Business. London, Lloyd`s List.

Paixao Casaca, A.C., Marlow, P.B. 2009. Logistics strategies for short sea shipping operation as part of multimodal transport chains. Marine Policy and Management, 36(1), 1-19.

Pantouvakis, A.M. 2007. Who pays the ferryman? An analysis of the ferry passenger's selection dilemma. Maritime Policy & Management, 34(6), 591-612.

Purju, A., Branten, E. 2013.The Economies of the Baltic Sea Region: Growth Patterns and Foreign Trade Now and in the Future. Journal of East-West Business, No 19.

Reinikainen, K. 2022. European ferry companies heading to choopy seas in cost-of-living crisis. Shippax Info, 22(11), 17-20.

Reinikainen, K. 2023. Accelerating economic recovery brightens outlook for the Baltic freight business. ShippaxInfo, 23(4), 24-27.

Serry, A. 2014. Dynamics of maritime transport in the Baltic Sea: regionalisation and

multimodal integration. Conference Proceedings of Maritime Transport Conference. Barcelona.

ShippaxMarket17. 2017. The 2016 Ferry, Cruise, Ro-Ro and High-Speed Year in Review with Analyses and Statistics. Halmstad, Shippax AB.

ShippaxMarket20. 2020. The 2019 Ferry, Cruise, Ro-Ro and High-Speed Year in Review with Analyses and Statistics. Halmstad, Shippax AB.

ShippaxMarket21. 2021. The 2020 Ferry, Cruise, Ro-Ro and High-Speed Year in Review with Analyses and Statistics. Halmstad, Shippax AB.

ShippaxMarket22. 2022. The 2021 Ferry, Cruise, Ro-Ro and High-Speed Year in Review with Analyses and Statistics. Halmstad, Shippax AB.

ShippaxMarket23. 2023. The 2022 Ferry, Cruise, Ro-Ro and High-Speed Year in Review with Analyses and Statistics. Halmstad, Shippax AB.

Stopford, M. 2009. Maritime economics (3rd ed.). London-New York, Routledge Taylor & Francis Group.

Thalassinos, I.E., Giannakopoulou, E., Th. Stamatopoulos, Th. 2016. Corporate Governance in Shipping: An Overview. Maritime Policy and Management, 43(1), 19-38.

Urbanyi-Popiołek, I. 2021. Management of the Ferry Shipping and Ferry Ports in Regional Transport Systems Between Continental Europe and the Nordic Countries. European Research Studies Journal, 24(4), 524-534.

Urbanyi-Popiołek, I. 2018. Challenges for Polish ferry market development in Baltic Sea Region. SHS Web of Conferences 58, 01030. GLOBMAR 2018.

Urbanyi-Popiołek, I. 2020. Challenges for the ferry shipping operation in the Baltic Sea region in the time of COVID-19 pandemic. Proceedings of the 36th International Business Information Management Association Conference (IBIMA), 4-5 November 2020, Granada, Spain: Sustainable Economic Development and Advancing Education Excellence in the era of Global Pandemic, 10157-10164.

Wild, P., Dearing, J. 2010. Development of and prospects for cruising in Europe. Maritime Policy and Management, 27(4), 315-333.

Zampeta, V. 2015. The impact of corporate governance and the cost of capital in shipping. International Journal of Business and Economic Sciences Applied Research (IJBESAR), 8(2), 19-34.

Zampeta, V., Chondrokoukis, G. 2022. An Empirical Analysis for the Determination of Risk Factors of Work-Related Accidents in the Maritime Transportation Sector. Risks, 10(12), 231.

Zampeta, V., Chondrokoukis, G. 2023a. A Comprehensive Approach through Robust Regression and Gaussian/Mixed-Markov Graphical Models on the Example of Maritime Transportation Accidents: Evidence from a Listed-in-NYSE Shipping Company. Journal of Risk and Financial Management, 16(3), 183.

Zampeta, V., Chondrokoukis, G. 2023b. Maritime Transportation Accidents: A Bibliometric Analysis. International Journal of Business & Economic Sciences Applied Research, 16(1).