Local ports as development centres

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EXECUTIVE SUMMARY

INCONE60 – Inland Blue Transport Connector E 60 is a three-year cross-border cooperation project of the Interreg South Baltic Cross-border Cooperation Programme 2014-2020. It is part-financed by the European Union (European Regional Development Fund). The partnership is made of five project partners: three R&D institutions – the Maritime Institute of Gdynia Maritime University (Poland, Lead Partner), EUCC Baltic Office and Coastal Research and Planning Institute (both from Lithuania), as well as two local port authorities – Port of Władysławowo (Poland) and Port of Oostende (Belgium). The goal of the project is to develop a concept for the creation of an alternative transport route along the international waterway E 60 and link it to a network of the inland waterways – E 30, E 40 and E 70. The project aims to formulate a set of transport solutions to support active development of peripheral coastal regions of the South Baltic area by focusing on local ports as growth centres.

The following study aims to analyse the local ports on Lithuanian, Polish, German, Danish, Swedish, and Belgian coast as development centres which are located along international waterway E 60. The research was conducted within the framework of the European project titled: *Inland Blue Transport Connector E 60* – INCONE60, within work package 3 – Transport economics and market review, activity D3.2.

The study is a comprehensive analysis of the state of the South Baltic local seaports and their development opportunities. The problems faced by managers of these ports have been identified and potential development opportunities have been presented.

In the first chapter of the study the authors try to present ownership patterns existing in the local ports of the South Baltic area. Over half of all investigated

ports are owned and operated by the municipalities where they are situated. Also many ports in the South Baltic coast are owned and managed using various forms of public-private partnership. Furthermore, the study attempted to identify different kinds of companies operating in the ports' area. As it happens, over 50% of them are linked with shipyard and shipbuilding sector. They are largely oriented to offer an extensive range of production services from shipbuilding to ship repair services.

The second chapter provides detailed description of sixty local ports located along E 60 waterway. Each port characteristics gives information about port ownership and management, available facilities and main companies operating within the port area.

Chapter three attempts to analyse the role of local seaports of South Baltic in the coastal regional development as well as interdependencies between the port and its hinterland region. On the one hand, the conditions and perspectives for the development of local ports strictly depend on such factors as the level, pace and directions of economic and social development of the country and region, development of local and regional transport infrastructure, as well as the European Union's policies on the maritime sector. On the other hand, local ports not being of primary importance for the national economy, can play a vital role in the economies of individual regions. Therefore, the economic impact of ports on the surrounding areas has been analysed and in particular their influence on local employment.

Numerous activities of most local seaports, especially in the South Baltic Region, are connected to fishery. However, in recent years Baltic fisheries have been experiencing difficulties related to the introduction of fishing quotas by the European Union, which results from deteriorating conditions of the Baltic environment. The possibilities of fishery improving local seaports economic

performance was analysed from the perspective of keeping their existing business profile.

Despite regional and environmental factors, it seems blue and green growth policies introduced at EU level may still have significant impact on the development of local ports in the South Baltic region. On this account the last subchapter of the study aims to present the blue and green technologies already used in local ports along E 60 , as well as the chances for their implementation in ports that do not yet operate under a model of blue or green growth.

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INTRODUCTION

The study was prepared within the framework of the European project titled: INCONE60 – *Inland Blue Transport Connector E 60*, within work package 3 – Transport economics and market review, within the activity D3.2. Analysis of local ports as development centres.

Many South Baltic local ports struggle to find new market niche for their activities in an innovative, post-fisheries and post-agriculture competitive environment of Baltic seaports. Wind energy services and aquaculture, coastal freight, leisure boating are the most promising maritime sector development directions that currently can be observed in the South Baltic. In many of these local ports, particularly, the smaller ones, recreational fisheries (sea-angling) is becoming more and more critical source of income than commercial fisheries. However, a closer analysis conducted within a framework of Deliverable 3.1 – Analysis of local ports and their impact or regional economy – revealed essential differences among the South Baltic local ports regarding their infrastructure, cargo handling facilities, cargo turnover.

Depending on the relative dominance of the seaport and its urban area, nine types of municipal port entities can be distinguished. They range from coastal port towns to the world seaport cities. Almost all South Baltic local and regional ports fall within the categories of coastal port towns, urban ports or 'out-ports'. Meanwhile, Oostende in Flanders, Cuxhaven in Lower Saxony, and five ports in the South Baltic area can be classified as a 'city-port', i.e., have optimal relations between the urban area and the port.

The international waterway E 60 (IWW E 60) is one of the longest international inland waterways in Europe. IWW E 60 in the South Baltic area runs

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along 25 subregions (NUTS 3). From the analysis of the database of local ports and their mapping, it is evident that the western part of the area, i.e., in Lower Saxony and Schleswig Holstein of Germany and Denmark features the majority of the local ports along the northern subroutes of IWW E 60. Meanwhile, going northwards and eastwards along the route the density of local ports declines which results from lower population density in coasts of Poland, Lithuania and Sweden.

Local seaports are prone to the same laws of economies of scale just as the global maritime players, meaning that larger ports have better opportunities to become more flexible and occupy a broader range of market niches. A mono-profile nature of the local port services is unsustainable and needs to change. Many local ports in Poland are currently specialising in the transhipment of mineral fertilisers and the export of Polish agricultural and forestry products, i.e., they follow the same functional model similarly to many local ports in Denmark. On the other hand, Kołobrzeg is the only local port in Poland, which has many features of an 'urban port' as well as 'out-port' profile. Police is another example beside Kołobrzeg.

After a thorough investigation of over 60 local ports in the South Baltic area, it is essential to consider whether the question of the importance of the port on the surrounding region is correctly formulated. Instead, it should be asked and investigated, what is the role of the surrounding region on the wellbeing, competitiveness, and viability of local ports. Six types of port regions can be listed: metropolitan region, industrial cluster, domestic gateway, distribution hub, peripheral, and mono-functional region. Within analysed NUTS 3 regions, only the Rendsburg – Eckernförde in Schleswig – Holstein region could be characterised as a domestic gateway.

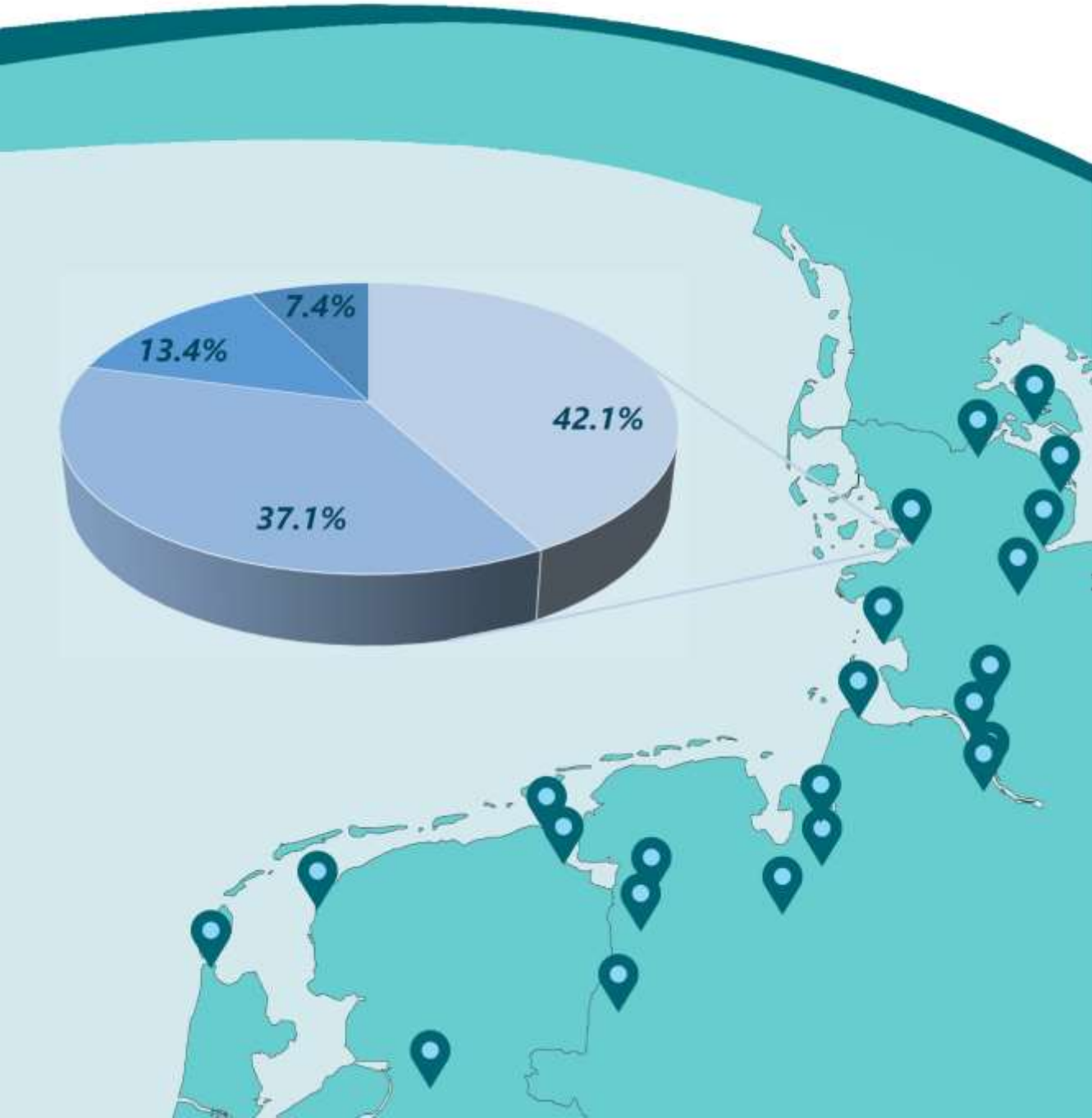
Moreover, this report aimed to investigate whether there is any significant impact of the 60 analysed South Baltic local ports on the local, or regional labour

market. The port area could and should serve as a convenient location for various companies, particularly innovative and competitive ones.

Within the framework of analysis of local ports located along the inland waterway E 60 as development centres, it was also essential to investigate the value of fishery and potential of blue and green technologies such as aquaculture, coastal and sea tourism, renewable energy, or blue biotechnology on ports development. Baltic fisheries are experiencing difficulties related to the introduction of fishing quotas for sea fish by European Union and periodic restrictions on fishing for selected species of fish. Blue and green growth may have a significant impact on the development of local seaports in the South Baltic region. However, it is difficult to determine for each local port the impact of the blue and green economy. Most of them can never benefit from the development of this type of economy, due to their location and function.

1

Ownership structure in the South Baltic local seaports



1. OWNERSHIP STRUCTURE IN THE SOUTH BALTIC LOCAL SEAPORTS

Referring to the operating conditions of seaports, it is common to focus mainly on the activities of port managements. Meanwhile, these conditions depend on a number of external and internal factors, and relate to both the port management and daughter companies or companies indirectly related to the port activities. In addition, it depends on the type of relationship with the domestic and international market. The land ownership structure in seaport areas is often multi-stakeholder. There are land properties that belong to the port authorities and the State Treasury, municipalities, cities as well as lands that are privately owned. These lands can be used by several business entities. [1]

Two realms of seaports operations can be distinguished: the management and exploitation. In general, management includes, performing activities related to formulating development strategies, creating material base for functioning and development, and constructing tools for regulating port activities. In the reality of market economy, the port management entity is generally the owner of port areas and most infrastructure facilities, and only sometimes elements of the superstructure (warehouses, transhipment facilities, floating rolling stock, etc.). These elements are usually owned by entities of the exploitation realm.

The analysis of the tasks distribution in the management and exploitation shows that the tendency is to separate these areas, although the existing solutions are very diverse. Management tasks are usually carried out by public entities: government administration bodies, port city self-government bodies or the so-

[1] Kuszewski, W. (2010). *Identyfikacja barier w integracji międzygałęziowej na przykładzie określonych terminali portowych jako kluczowych ogniw procesu transportowego*, internal materials of the Maritime Institute in Gdańsk, Gdańsk.

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called autonomous boards. The private sector rarely undertakes to manage public ports. Private ports, owned by industrial groups and servicing the import of raw materials and export of products from plants that belong to these groups are much more common, e.g. refinery oil ports, ore terminals for smelter plants or phosphate terminals for chemical plants, etc.[2]

Keeping significant areas out of the actual ownership of ports may result in difficulties to plan port-related investments and attract investors. Solving the problems of the hinterland accessibility is a responsibility of the port management companies only to a limited extent. Cooperation with city and regional authorities is of great importance, as it is their responsibility to make construction decisions and to modernize surrounding areas and transport routes to ports. This, in turn, depends on the financial capabilities of cities, municipalities or regions and the authorities' perception of the role that ports play in their area. On the other hand, the construction of motorways or expressways and the modernization of existing national roads leading to ports remain completely outside their control.[3]

Over 50% (32 out of 62) of all investigated local ports in the South Baltic area are owned and operated by the municipalities in whose territories they are located. Some of them are owned and operated by several neighbouring municipalities (e.g., Holstebro and Struer municipalities in Denmark). Typically, they are managed either as self-governing entities with the semi-autonomous management board (e.g., Hanstholm in Denmark), or as municipal infrastructure enterprises (e.g., Eckernförde, Elsfleth and Stralsund in Germany, or Simrishamn in Sweden). For instance, Uddevalla Port is a seaport owned by Uddevalla Municipality in western Sweden. It is operated by Uddevalla Hamnterminal which is a fully-owned

[2] Luks, K. (2009). *Polityka wobec portów lokalnych na przykładzie portu Elbląg*, internal materials of the Maritime Institute in Gdańsk, Gdańsk

[3] Kuszewski, W. (2010). *Identyfikacja barier w integracji międzygałęziowej na przykładzie określonych terminali portowych jako kluczowych ogniw procesu transportowego*, internal materials of the Maritime Institute in Gdańsk, Gdańsk.

subsidiary of Uddevalla Utvecklings AB and included in Uddevalla Municipal Group.

In Germany many public seaports (e.g. Brake, Husum, etc.) are fully or partly owned by the federal state and operated by the state-owned port operator (e.g., Niedersachsen Ports GmbH & Co. KG in Lower Saxony). For instance, Glückstadt Port is owned by the federal state of Schleswig-Holstein, and its operator is Glückstadt Port GmbH & Co. KG owned by Schramm Group. The state port of Glückstadt was leased by the state of Schleswig-Holstein in 1995 to Glückstadt Port GmbH, a subsidiary of the Schramm Group, which now operates the port. Therefore, Glückstadt Municipality is not a partner in port ownership or management, which is a not typical case for inland waterway ports.

The public port management patterns in Germany are most complicated in the South Baltic area. For instance, Husum Port is owned by the State of Schleswig-Holstein and is operated by the State Agency for Coastal Protection, National Park and Marine Protection. The port facilities are operated by ATR-Landhandel GmbH & Co KG and the Hauptgenossenschaft Nord AG. Similarly, Rendsburg County Port (Kreishafen Rendsburg) is owned by Rendsburg-Eckernförde County, operated by the business development agency of the Rendsburg-Eckernförde County and caters for the needs of the region. Meanwhile, the port of Rendsburg Osterrönfeld is operated by Rendsburg Port GmbH, which in turn is a merger of Brunsbüttel Ports GmbH and Ahlmann Zerssen GmbH & Co. KG.

Many local ports in the South Baltic area are owned and managed as some kind of public-private partnership. The simplest situation is when the port is owned and operated by the municipality or a municipal stakeholder's company whereas at least one marina for leisure boats is owned and managed by a private entity – stakeholder company, or yachtsmen's association. This model is popular in

Denmark (e.g. Årøsund, Assens and Faaborg), but also common in other countries (Büsum and Neustadt in Germany, or Kalmar and Landskrona in Sweden).

In Sweden, but also in other South Baltic countries, the public-private partnership in local port ownership and operation is characterised by the following pattern: the port is owned by the municipality but operated by a stock company with mixed ownership. For instance, Varberg Port is owned by Varberg Municipality and managed by Hallands Hamnar AB, which is the principal port operator established as a private-public partnership managing Halmstad Port and Varberg Port – two significant seaports in Halland County. Sölvesborg Port is a municipal port operated by Sölvesborgs Stuveri & Hamn AB which is a stock company with mixed ownership where the shares are distributed in the following way: Sölvesborg Shipping AB owns 42.1% of shares, Sölvesborg Municipality – 37.1%, minor shareholders – 20.8% of shares.

In some cases, public and private owners own different areas or terminals in the same seaport. For instance, the Southern Harbour of the Horsens Port in Denmark is a private harbour owned by Horsens Haven A/S. Meanwhile, the Northern Harbour is owned by Horsens Municipality but it is managed by Horsens Haven A/S. In Germany, Cuxhaven Port is owned by the federal state of Lower Saxony and operated by the state-owned port operator Niedersachsen Ports GmbH & Co. KG Cuxhaven branch. However, the port company CuxPort GmbH, which operates the universal CuxPort terminal, is a subsidiary of Rhenus AG & Co. KG (74.9%) and the Hamburg-based HHLA (25.1%).

Such a model is also popular among local ports in Poland. For instance, Hel Port is managed by a State Treasury company – the Hel Koga Sea Port Board that was established in 2007 under the name "Port Service Enterprise Koga in Hel". Part of the processing facilities in the central part of the port is owned by the fish processing company "Koga – Maris". Within the administrative boundaries of the

port, there is also the area owned and used by the municipality. The major part of Władysławowo Port is owned by the Puck County, and a significant part of the port area is owned by the Gdynia Maritime Office. The port is operated by "Szkuner" Ltd., a public company of fisheries and fishery services with headquarters in Władysławowo.

Unlike the majority of other South Baltic ports, the ownership and management of the seaport of Ustka is rather patchy. Ca. 42% of the port areas are owned by the Maritime Office. Euro-Industry Ltd. is another significant owner or operator on 21% of the total land area of the port. It owns the outside port areas of the former Ustka Shipyard as well as is a managing agent on the area of the former silo (owned by El-Port Ltd.). The Korab SA company specialising in storing and transhipment of pulp and paper products has a perpetual lease of land covering another 19% of the port area.

The remaining group of local ports is comprised of the ports, which are fully owned or operated by private enterprises. For instance, in Falkenberg (Sweden), the port facilities are owned by the municipal company Falkenbergs Hamn AB, which rents them out to the privately owned Falkenbergs Terminal AB. In Denmark, Rødby Port is owned by Scandlines Danmark A/S, Søby Port A/S is a self-owned institution, Hundested Port is owned and managed by the Hunde-sted Harbour Port Partnership (I/S). In Poland, the state-controlled Grupa Azoty uses the Police port for product export and raw material import purposes. A 90% stake in the seaport owner and operator, Port Morski Police, is owned by Grupa Azoty Police S/A, the local subsidiary of Grupa Azoty S/A.

2

Companies operating in the South Baltic local seaports

2. COMPANIES OPERATING IN THE SOUTH BALTIC LOCAL SEAPORTS

Quite naturally, over 50% (37 out of 64) of all investigated enterprises in the local ports of the South Baltic area are shipyards. Most of these shipyards offer an extensive range of production services from shipbuilding to ship repair services: steelworks, piping, hydraulics, mechanics etc. The absolute majority of these shipyards in all South Baltic coastal regions have their services approved by major classification societies, and they have a strong maritime history and experience. They own their basins, mooring quays, indoor drydocking facilities, slip-ways, synchro-lifts as well as specialised assembly and repair halls, workshops and equipment.

Most of these shipyards build and service ships of different sizes and types: ferries, special vessels, naval vessels, fishing trawlers, tugs, floating cranes, and cargo ships. These shipyards are not only building the new vessels but also offer different kinds and levels of renovations and modernisations, including renovations and modernisation of engines and navigation equipment, pipe and electricity work and tank cleaning. Some of the shipyards, like Flensburger Schiffbau GmbH & Co. KG located in the federal state of Schleswig-Holstein of Germany, focuses on the design and construction of tailor-made designs for shipowners and operators: steelwork, interior fittings, mechanical engineering, pipework, painting, electrics.

However, despite a long history and rich shipbuilding traditions in most of the South Baltic local ports, they are rather prone to bankruptcy under a hefty competition. For instance, Elsflether Werft AG is a shipyard located on the Hunte River in Elsfleth, the federal state of Lower Saxony (Germany). At the end of October 2019, the insolvent shipyard was bought by the Fr. Lürssen Werft GmbH

& Co. KG shipyard from Bremen. In April 2020, Lürssen announced that it wanted to close the Elsflether shipyard in the same year because the location was not considered to be sustainable.

The threat of bankruptcy makes the South Baltic shipyards look for more competitive market niches. For instance, Faaborg Shipyard A/S in Denmark offers maintenance and new construction of composite vessels. Initially, the production focused on yachts made of fibreglass reinforced polyester but over time the shipyard gained an ever-stronger profile in building fishing boats and specialised vessels, which quickly became the main profile of the enterprise. TrawlerBoost is an innovative fishing trawler repair and renovation approach offered by North Sea Yard A/S – a new shipyard established at Hanstholm (Denmark) by partners with years of experience with all forms of servicing for fishing vessels. HB Hunte Engineering GmbH in Oldenburg (Germany) focuses on innovative design and engineering of LNG tankers.

Remarkably, Papenburg, an estuarine seaport in the federal state of Lower Saxony (Germany) is internationally known for innovative shipbuilding at the shipyard Meyer Werft GmbH & Co. KG. It is one of the largest and most modern shipyards in the world. The role of Meyer Werft is so critical for the German shipbuilding economy that the Ems river estuary is dammed up once or twice a year with the help of the barrier at Gandersum so that the ocean-going vessels completed at Meyer Werft could be transferred to the North Sea.

The building of superyachts is another field of specialisation of the South Baltic shipyards. These shipyards can handle all types of building, decommission and conversion of the latest marine luxury boats, designing superyachts using state-of-the-art materials and technologies. These shipyards offer an extensive range of services catering to the needs of any customers, for instance, Robbe und Berking Classics GmbH & Co. KG shipyard in Flensburg (Germany) focuses on building

classical sailing boats and their replicas, and on restoring classical motor and sailing yachts and building replicas of particularly beautiful classics that have been lost.

Similarly, many small-scale shipyards in the investigated South Baltic local ports specialise in shipbuilding and repair of wooden vintage boats, with specific craft skills, quite often using their ship timber, paints and specialised workshop facilities. The staff at such shipyards, mainly located in local Danish ports, also provides advice and guidance on which solution best suits the customers who are keen to preserve and cherish the Baltic wooden boat culture. Last but not least, there are many small-scale private leisure boat-yards in the investigated local South Baltic ports offering various services of small-scale leisure boat repair, maintenance and dry-docking for winter.

Manufacture of human food products and animal feed is another important field of companies operating in the ports' area in the investigated local South Baltic ports, especially in Denmark. For instance, Hamlet Protein A/S located in the port of Horsens is an innovative enterprise of R & D and production of patented soy-based speciality proteins for young animal feed.[4]

Wittrup Seafood A/S, also in Denmark, processes fresh mussels for export and retail. The company catches, processes and produces ca. 4 000 tonnes of mussels per year. Similarly, crab fishing and processing play an essential role in the port of Büsum in the federal state of Schleswig – Holstein (Germany).

Årøsund Port hosts AquaProduction A/S, one of Denmark's most advanced rainbow trout slaughterhouses integrated with a processing unit in the port area. Over 5 000 tonnes of rainbow trout are slaughtered in Årøsund annually. Along with aquaculture, many local South Baltic ports still host fish processing facilities. For instance, 25% of the total economic value added of Skagen Port is still

[4] HAMLET PROTEIN - What we do. https://hamletprotein.com/en/what-we-do/

generated by high-seas fisheries and fish processing sector. Skagen is the leading fishing port in Denmark. There are numerous fish processing enterprises in the fishing harbour. Similarly, there are 35 fish processing companies with ca. 1 000 employees in Cuxhaven, Lower Saxony (Germany).

Rügen fish AG (formerly Rügenfisch GmbH) is headquartered in Mukran Port, Mecklenburg – Western Pomerania (Germany). The company, which was wholly modernised after German reunification, employs about 200 people and produces a large range of canned fish. Skillinge Fisk-Impex AB in Simrishamn Port is one of the largest fishing companies in Sweden. Most of the company's fish are fished along the eastern coast by local fishermen. Skillinge Fisk-Impex AB receives, unloads, sorts, fillets and packs the catch in the Simrishamn's fishing port. Most of the catch is sold on the Swedish fresh fish market.

Nakskov Mill Foods A/S is located in Nakskov Port (Denmark) and dates back to 1898. It is a robust, innovative and Danish manufacturer and partner within high-quality breakfast cereals. Over the years Nakskov Mill Foods A/S has supplied breakfast products and is a manufacturer of Private Label breakfast cereals for the last 100 years, 90% of products are exported. Ardo A/S has its factory in Orehoved Port (also Denmark). Ardo A/S produces and markets a wide range of frozen vegetables, fruits, berries and vegetable-based dishes, both under the Frigodan brand and partly under private label. Of its production, ca. 80% goes for domestic sales and the remaining 20% for export.

Last but not least, DanDuck A/S, which is Denmark's only duck slaughterhouse, is located at the Eastern harbour of the port area of Struer. Beside ducks, the enterprises culls, processes and exports other birds, both from their own production and from the farms in the region and beyond. Similarly, Thisted Port hosts Tican Fresh Meat A/S, one of Denmark’s most advanced pig slaughterhouses integrated with meatpacking and processing units in the port area. Tican Fresh

Meat A/S is an international food company with the production and sale of fresh and frozen pork to retail and industrial customers. It has an annual output of 3.4 million slaughtered pigs which make Tican Fresh Meat A/S Denmark's second-largest slaughterhouse.

Some of the investigated South Baltic and Lower Saxonian local ports host innovative companies from the sectors, which are entirely unrelated to the port activities. For instance, Sønderborg Port (Denmark) has not received any ships in the last few years, but a Sønderborg-based global ICT company Hansen Technologies Denmark A/S has its headquarters in the port area. Similarly, the port of Uetersen (Lower Saxony, Germany) is almost defunct regarding navigation due to siltation, but the port hosts a pharmaceutical company Nordmark producing gastrointestinal drugs and active ingredients collagenase and pancreatin. The port area also hosts Feldmuehle GmbH, which specialises in the production of photo printing paper and wet-strength label paper.

Indeed, along with the local Danish ports, also the Lower Saxonian ones are outstanding innovation hubs. For instance, several innovative companies are located in the Oldenburg port area: Ashampoo GmbH & Co. KG, BASF Coatings GmbH, CEWE Foundation & Co. KGaA, EWE Aktiengesellschaft with its subsidiaries (EWE Vertrieb GmbH, EWE Trading GmbH, EWE TEL GmbH, EWE NETZ GmbH, BTC AG etc.). Papenburg Port is the seat of the test site of Automotive Testing Papenburg GmbH & Co. KG and many other well-known companies from various innovative industries.

The Nordenham seaport (Lower Saxony) has established itself as a service port and as a production location for the airspace and offshore wind energy industries. Premium AEROTEC GmbH plant in Nordenham located next to the port area is a subsidiary of the European airspace Airbus. Norddeutsche Seekabelwerke (NSW), Kronos Titan GmbH & Co. OHG, Xstrata Zinc GmbH,

Metaleurop Weser Blei GmbH, all produce different products catering to the needs of the North Sea offshore wind energy sector. Furthermore, Steelwind Nordenham GmbH produces monopiles, and NKT Cables GmbH produces cables for the offshore wind farms.

A few Swedish local ports act as innovation hubs for creative industries. Kalmar Port is the main site of the Linnæus University campus with the School of Economics, Institute for Culture Research and the Fojo Media Institute located there. Teko-Tryck and Sölvesborg AB located in Sölvesborg Port produces and delivers unique screen-printed Swedish sponge cloths and towels of the highest quality to designers, companies, chain stores and distributors worldwide. Teko Tryck introduced the screen-printed Swedish sponge cloth on the market in 1994. Most design and promotion cloths on the world market are printed in the Sölvesborg port area and delivered to Germany, France, USA, UK, Japan, South Korea and Australia.

Many other South Baltic local port areas host production companies from different sectors of the economy. Reiling Glasrecycling Denmark ApS has the leading location in Næstved Port. It is a recycling company specialising in various types of hollow glass and flat glass. East Metal A/S has its office at Nakskov Port (Denmark) where metal structures up to 130 tonnes are assembled. Skive Sten & Grus A/S, is a stone crushing enterprise on Skive Port (Denmark) producing granite sheaves, sand, gravel and paving. Cheminova is a Danish pesticide manufacturer based in Aarhus. Its subsidiary plant operates as Cheminova Germany. The products produced in the factory located in the Stade-Bützfleth port area (Lower Saxony) include various pesticides for sale, mainly in Europe and Latin America.

Also many Swedish local ports also offer location sites for various production companies. Oresund Steel Construction AB located in Landskrona Port produces

large steel structures, while G&M Envases Universales Sweden AB located in Lysekil Port specialises in canning and other high-quality and innovative metal packaging solutions for the food, beverage and media industry. An Uddevala-based Scanfast Scandinavian Fastening AB specialises in manufacturing and sale of compressed air powered tools such as nail guns, electric-powered tools and other fastening equipment. Archemi AB located in Varberg Port specialises in manufacturing of chemicals which are primarily used for flue gas purification and water treatment.

Unlike the above local ports, the investigated local ports in Poland and on Bornholm (Denmark) are profiling themselves in recreational services. Recreational fisheries (sea angling) is becoming a more critical source of income than commercial fisheries for Darłowo, which is turning into a Polish ‘capital of recreational cod fishing‘. Currently, the entire port of Hel is dedicated to leisure purposes. Beside the marina and the water tram pier, there are three companies offering diving services. Finally, the Nexø Shipyard (Bornholm, Denmark) in the heart of the harbour is converted into a skateboarding centre.

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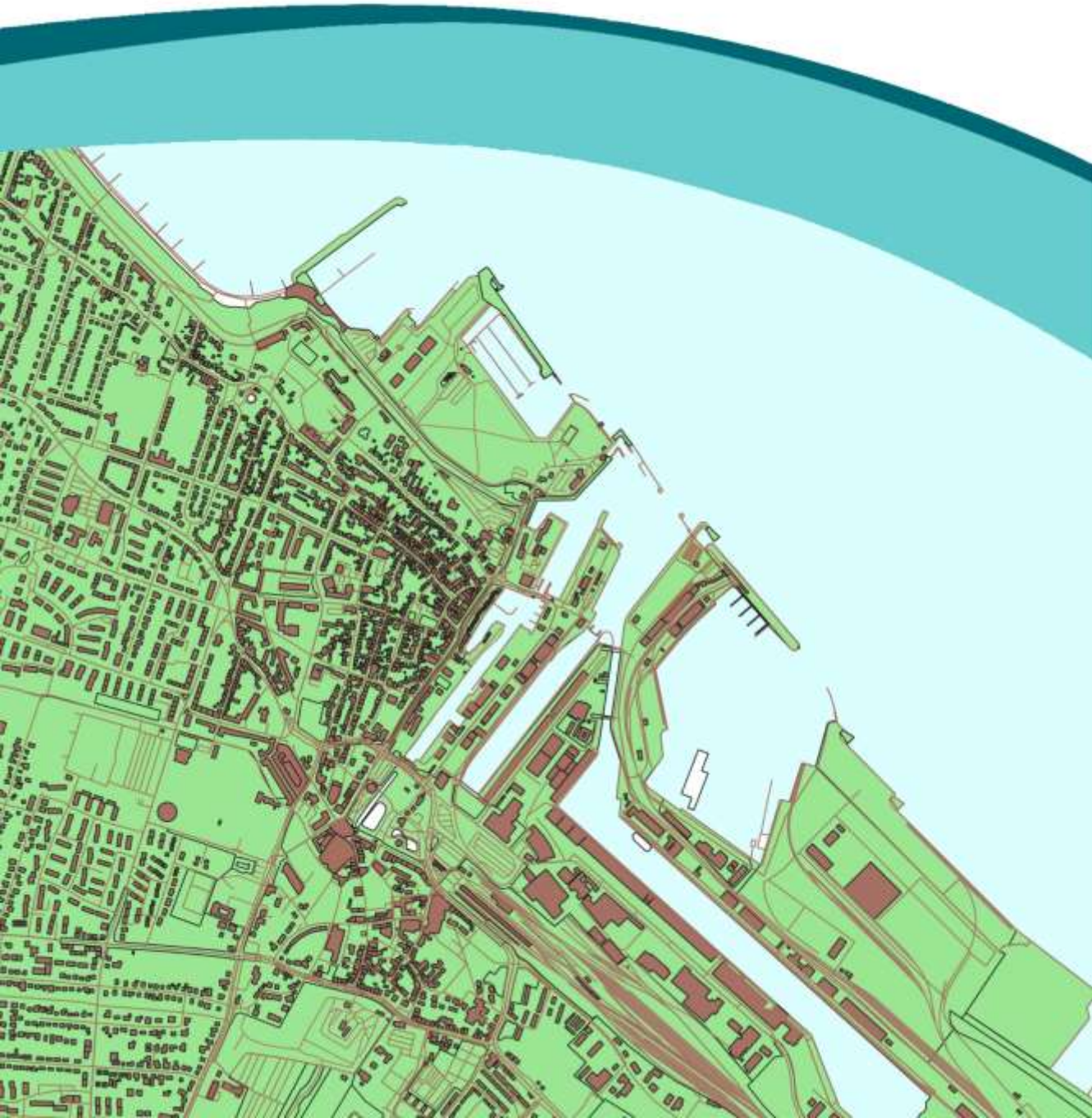
3

Local seaports characteristics



3. LOCAL SEAPORTS CHARACTERISTICS

3.1. Belgium

3.1.1. Oostende

Oostende is a port city in the Belgian province of West Flanders, located on the central part of the Belgian North Sea coast. The city is an important centre of tourism and commerce, with a population of about 71.5 thou. (2019). Oostende is a seaport on the Bruges-Oostende canal. After the port of Bruges-Zeebrugge, it is the second-largest coastal (non-estuarine) port in Belgium. However, Oostende is significantly less important to the Belgian economy than Bruges-Zeebrugge. Oostende is 40 times behind Zeebrugge in terms of cargo turnover. The port of Oostende used to be an essential ferry port. However, since the opening of the Eurotunnel between France and the UK in 1994, passenger traffic in Oostende has declined as longer journeys by sea are not worthwhile compared to a fast Eurostar train or a low-cost airline.

The loss of ferry traffic also harmed ro-ro cargo and container turnover with the UK. The transportation of ro-ro cargo and containers between Oostende and south-east England was finally disrupted in 2013 after the bankruptcy of TransEuropa Ferries ferry line, which provided ferry services between Oostende and the English port of Ramsgate. Since then, the port of Oostende has been actively moving towards the development of bulk cargo handling and offshore sectors. In addition to construction materials such as gravel and sand, the port of Oostende, also handles other dry bulk cargo. Most ships come from the British ports of Ramsgate and Ipswich. Oostende also has a fishing port, marina, and a cruise ship terminal (Figure 1).

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Figure 1. Port area of Oostende

Source: Based on © OpenStreetMap authors.

To meet the demand for readily available indicators measuring developments in value-added and employment at Belgian ports, the National Bank of Belgium has been publishing a yearly flash estimate since 2006. The figures for 2018 are estimates generated using statistical techniques – pending the final figures to be published in the spring of 2020 in the annual port monitor. Two clusters are considered: the maritime cluster and the non-maritime cluster. The maritime cluster, which includes branches of the ports themselves, and whose existence is essential to them (management and maintenance, shipping, transhipment, affreightment, storage, dredging, fishing, maritime services, etc.). The segments that do not have an immediate economic link with a port activity which exhibit a

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close interdependence with it are known as "non-maritime" and include the segments of the industry, wholesale trade, transport and logistics services.[5]

According to the National Bank of Belgium, the total direct value-added in millions of euros at current prices at Oostende in 2018 was as follows: maritime cluster: 164 million €, non-maritime cluster: 393 million €, total: 557 million €. It is evident that the non-maritime cluster currently generates more than twice the total direct value-added in Oostende compared to the maritime sector. The port of Oostende generated more value-added in 2018 compared with 2017. The growth in the port of Oostende was driven by the dredging sector and the metalworking industry. Growth of dry bulk – the main category of cargo – was responsible for the highest cargo turnover in five years at the port of Oostende (Table 1).[6]

Employment at the Belgian ports grew by 1.2% in 2018 on the back of a significant rise in the number of jobs registered in the cargo handling sector, part of the maritime cluster. In 2018, Oostende Port generated additional jobs compared to 2017. The metalworking industry and also the 'other logistic services' branch created new jobs at the port of Oostende. Cargo traffic at the Belgian ports grew by 4.8% in 2018. According to the National Bank of Belgium, the direct employment at Oostende Port was 1 737 employees in the maritime sector in 2018 and 3248 employees in non-maritime sector altogether making almost 5000 (4986) employees (Figure 2).[7]

Table 1.

Cargo traffic in Oostende in 2018 (in thousand tonnes)

Containers	0
Roll-on/roll-off	0
Conventional general cargo	80

[5] Belgian ports post employment growth for third consecutive .... https://www.nbb.be/doc/ts/enterprise/press/2019/cp190925en_havens.pdf
[6] Ibidem
[7] Ibidem

Liquid bulk	27
Dry bulk	1402
CARGO TRAFFIC	**1509**

Source: Bank of Belgium.

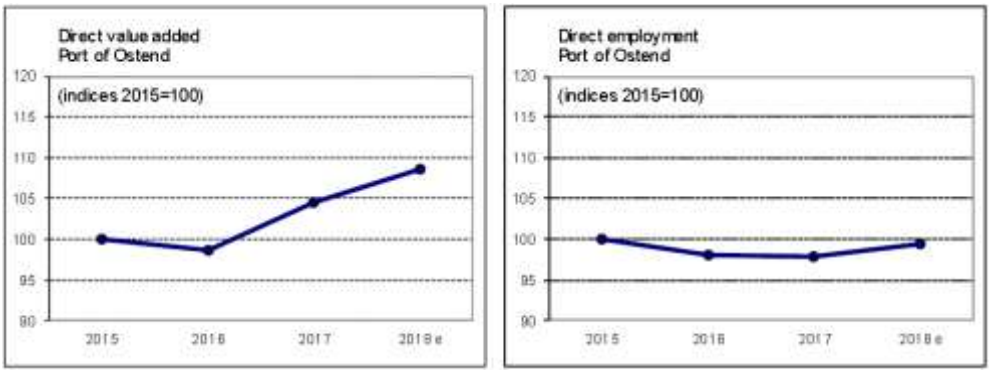

Figure 2. Direct value-added and employment in the Port of Oostende

Source: Bank of Belgium.

Scheepswerf IDP shipyard is one of the significant metal processing enterprises in the port of Oostende. It offers a wide range of production services including on-site ship repair services: steelworks, piping, hydraulics, mechanics. It specialises in construction, repair and maintenance of all kinds of professional vessels: tug, fishing boats, patrol boats, dredging equipment, pilot ships, navy ships, workboats in general. Certified welders, fitters, special profile engineers are employed there.

Works at Scheepswerf IDP shipyard are approved by major classification societies, and the shipyard has a strong maritime history and experience (the company was founded in 1922). It has its mooring quays and the following drydocking facilities: a synchro lift of 1 000 tonnes and a 35 m x 13,5 m workload as well as a synchro lift of 1 750 tonnes and an 80 m x 18 m workload. The following facilities are also available at the Scheepswerf IDP shipyard: workshops

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for mechanics, steel construction and pipe fitting, a large ship assembly hall (78 m length) for indoor drydock work.

3.2. Denmark

3.2.1. Assens

Ownership and management: Assens Port is owned by Assens Municipality. The marina in the southwestern part of the port is owned and managed by Assens Marina A.m.b.a.

Port outline: Assens Port consists of Northern Harbour, Central Harbour, Southern Harbour and Assens Marina. The Northern Harbour is reserved for cargo and commercial vessels. Central Harbour accepts leisure boats and charter boats that are too large for Assens Marina. In the inner part of Central Harbour, there is a ferry slip for the Bågø ferry. The Southern Harbour is reserved for Assens Shipyard (Figure 3).

Facilities: Commercial port area, a marina, a shipyard with two floating docks, one for ships up to 100 x 18.5 m and one up to 80 x 14 m. The port has two 32-tonne mobile cranes. Marina has a crane of up to 27 tonnes load capacity as well as a mast crane, the equipment and service workshop, a slipway as well as a diesel fuel burkering station.

Main enterprises in the port area. Assens Shipyard A/S builds and services ships of different sizes and types: ferries, special vessels, superyachts, fishing trawlers. The shipyard handles regular repair, as well as restoration, for all types of vessels. The shipyard also offers any kind of service and inspection themselves for the vessels that have left the shipyard over the years. The shipyard can handle all types

of decommission or conversion of vessels in everything from ice-class fishing vessels to the latest marine luxury boats.

Figure 3. Port area of Assens

Source: Based on © OpenStreetMap authors.

3.2.2. Faaborg

Ownership and management: Faaborg Port is owned by Faaborg-Midtfyn Municipality. The marina in the is owned and managed by Faaborg Marina A.m.b.a.

Port outline: Faaborg Port consists of Outer Harbour, Inner Harbour, Ferry and Commercial Harbour and Faaborg Marina (Figure 4).

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Main enterprises in the port area. Faaborg Shipyard A/S builds and services ships of different sizes and types. It performs, among other things, repair, maintenance and new construction of composite vessels. Initially, the production focused on yachts made of fibreglass reinforced polyester, but over time the shipyard gained an ever-stronger profile in building fishing boats and specialised vessels, which quickly became the main profile of the enterprise. However, the shipyard has still considerable experience in yacht repair, repainting of yachts, motor replacements, installation of bow thrusters, osmosis treatments. The shipyard has a basin of ca. 12 000 m^2, wharf with a total length of 200 m, water depth of at least 5 m, an adjacent land area of 25 000 m^2, capacity to repair vessels up to 65 metres in length, a floating dock a capacity up to 600 tonnes, dual bedding systems with a capacity of up to 150 tonnes. The facilities have the opportunity to service both private and commercial boats. There is also the composite chamber with a casting hall, the electrical department for such tasks as new electrical installations, repair and troubleshooting.

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Figure 4. Port area of Faaborg

Source: Based on © OpenStreetMap authors.

3.2.3. Hanstholm

Ownership and management: Hanstholm Port is owned by Hanstholm Municipality. It is a self-governing port with the semi-autonomous management board.

Port outline: Hanstholm Port consists of the Fore Harbour and eight inner basins: first, second and third basins are designated as fisheries and commercial harbours, while fourth to eighth basins are designated purely as fishery harbours. Roshage Mole is located ca. 1 north of Hanstholm Port, which extends approx. 310 m towards N to approx. 3.5 m of water and a width of 6.2 m. The outermost part of the pier is 2.2 m above the water (Figure 5).

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Main enterprises in the port area. TrawlerBoost is offered by North Sea Yard A/S – a new shipyard established at Hanstholm by partners with years of experience with all forms of servicing for fishing vessels. It combines highly specialised professional knowledge with qualified and competitive practical implementation. North Sea Yard A/S is the joint initiative of a group of well-established and highly regarded local companies with a broad range of competencies. It also works with several subcontractors who can be called in to assist with specific tasks. North Sea Yard A/S offers renovation according to an innovative TrawlerBoost service check – or as an independent project. It carries out renovations from major structural changes such as rebuilding the wheelhouse, installing a bulbous bow, extending the hull, etc., down to minor changes.

Figure 5. Port area of Hanstholm

Source: Based on © OpenStreetMap authors.

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3.2.4. Hobro

Ownership and management: Hobro Port is owned by the Municipality of Mariagerfjord.

Port outline: Hobro Port consists of the basin open to the fjord (Figure 6).

Main enterprises in the port area. Hobro Værfet A/S is a specialised shipyard for wooden vintage boats with specific craft skills for maintaining and repairing wooden vessels of all kinds. The staff also provides advice and guidance on which solution best suits our customers. The shipyard also builds wooden vessels from the first ridge to the last deck. It is also a certified applier and distributor of Hempel Paints for ships.

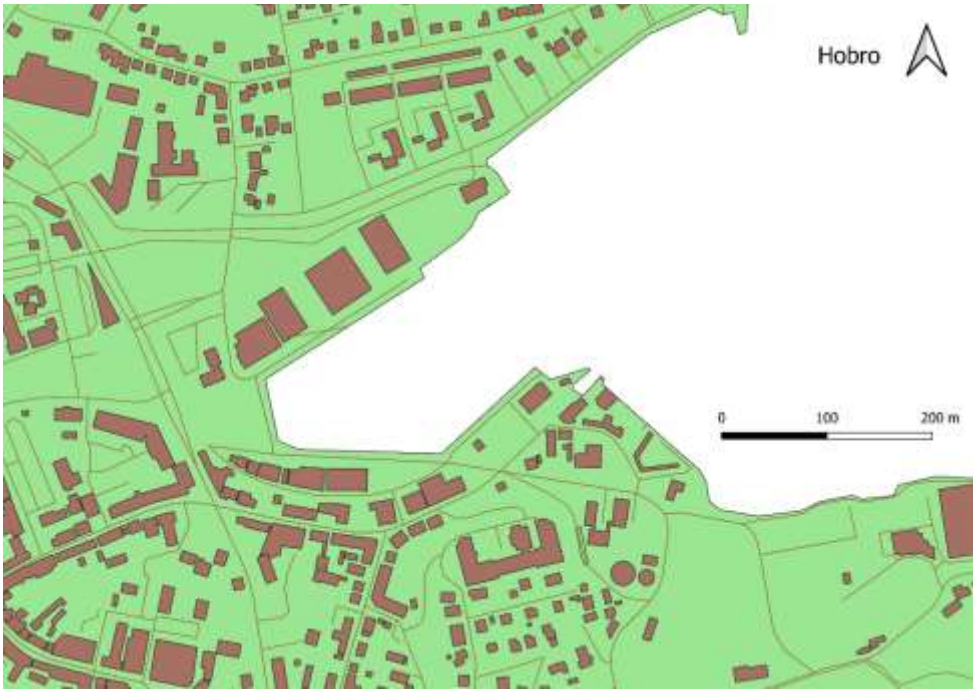

Figure 6. Port area of Hobro

Source: Based on © OpenStreetMap authors.

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3.2.5. Horsens

Ownership and management: Horsens Port consists of Southern Harbour and Northern Harbour. Southern Harbour is a private harbour owned by Horsens Haven A/S. Northern Harbour is owned by Horsens Municipality but is managed by Horsens Haven A/S.

Port outline: Southern Harbour comprises three basins for leisure boats and one for fishing boats. Northern Harbour has one basin allocated for service vessels (Figure 7).

Facilities: Slipway with crane for ships of up to 100 tonnes. Three mobile cranes with a hook and a grab, max. 80 tonnes.

Main enterprises in the port area. Hamlet Protein A/S located in the port of Horsens is an innovative enterprise of R&D and production of patented soy-based speciality proteins for young animal feed. The outcome of the patented bioconversion process is speciality soy proteins full of valuable nutrients that are easy to digest by young piglets, calves and other livestock in the first months of their lives. These proteins are essential building blocks for the healthy growth of the livestock. Experts at Hamlet Protein A/S document the value-adding performance of their developed and patented products in international trials. At any one time, at least 30 feeding trials are underway at farms and universities.[8]

Wittrup Seafood A / S packages and processes fresh mussels for export and retail. The company produces approx. 4 000 tonnes of mussels and employs approx. 30 employees. Wittrup Seafood A / S is mainly self-sufficient with mussels. The company has four mussel boats and has fishing rights on the Isefjord in Zealand and on the east coast of Jutland. Via a sales office in the Netherlands, most of the mussels are exported from Wittrup Seafood to retail chains in Europe, and the rest

[8] HAMLET PROTEIN - What we do. https://hamletprotein.com/en/what-we-do/

is sold to Danish fishmongers and restaurants. Wittrup Seafood A / S is located at the end of Horsens Harbour. The mussels can be loaded directly onto the quay. Wittrup Seafood A / S was founded in 1989. The company is today one of Denmark's largest suppliers of fresh hand-sorted mussels.[9]

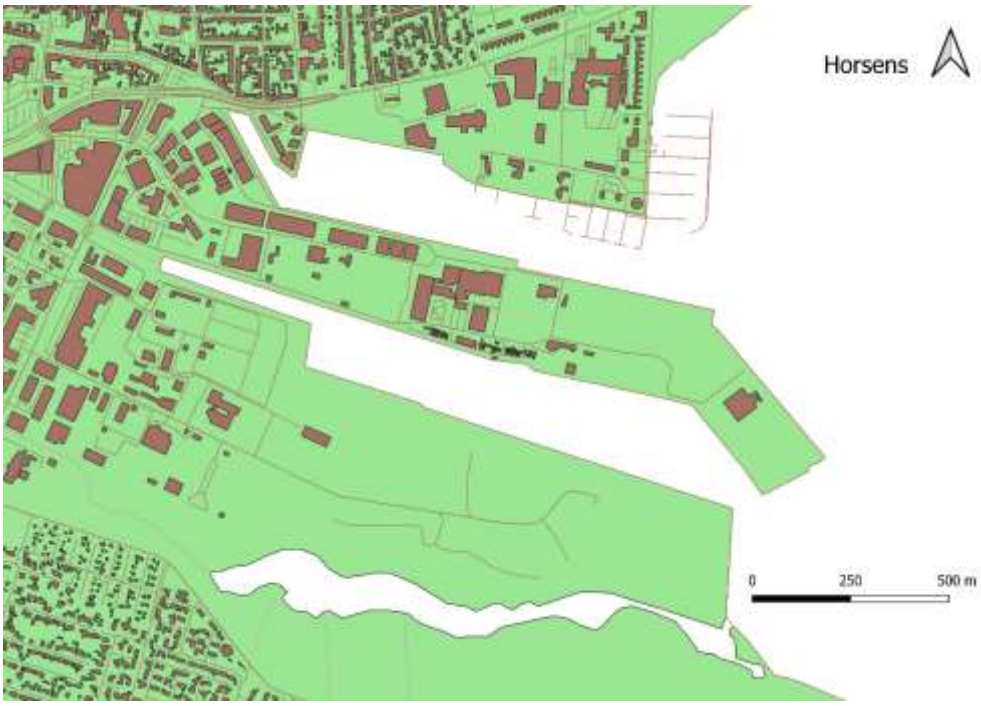

Figure 7. Port area of Horsens

Source: Based on © OpenStreetMap authors.

3.2.6. Hundested

Ownership and management: Hundested Port is owned and managed by the Hundested Harbour Port Partnership (I/S).

[9] Wittrup Seafood A/S, www.wittrup-seafood.dk/gb.html, accessed on 04.05.2020.

Port outline: Hundested Port includes Northern Harbour with five basins. Outer Harbour is reserved for the ferries to Rørvig, smaller cargo ships and larger sailing vessels. Central Harbour and Inner Harbour are marinas for leisure boats. Southern Harbour is a combined basin for fishing trawlers and leisure boats, and finally, there is a basin where a marina is partially expanded. There is a 260 m long cruise ship berth, which can be accessed by both cruise ships and bulk carriers. There is also a Commercial Port with a bulk cargo quay, two ferry berths and an approx. 320 m long packing warehouse quay with ro-ro ramps at both ends (Figure 8).

Facilities: Machine workshops and boatyards. Quay for fishing cutters. Slipway. Weighbridge. A 500-kg mast crane, a 4-tonne mobile crane and an 80-tonne container crane. A 5-tonne container truck for 40- and 20-foot containers. Mobile sludge cleaner.

Main enterprises in the port area. A. Henriksen Shipping offers warehousing services at the terminal in Hundested where it operates eight warehouses comprising 14 000 m^2. A. Henriksen Shipping has access to 800 m of the deep-sea quay. It has warehouses for all kinds of cargo such as bulk, containers, dangerous goods and general cargo, as well as modern, secure facilities for storing all kinds of wood, sand, stones, steel products, concrete elements, as well as Full Container Load (FCL) and Less than Container Load (LCL) cargo. Concerning warehousing the company offers added services such as cargo sampling, batching, paperwork, etc.

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Figure 8. Port area of Hundested

Source: Based on © OpenStreetMap authors.

3.2.7. Hvide Sande

Ownership and management: Hvide Sande Port is owned by Ringkøbing-Skjern Municipality and operated as an autonomous municipal port.

Port outline: Hvide Sande Port is built with the drainage sluice established for the drainage of Ringkøbing Fjord, which through an opening in the concrete dam and the canal between the piers is connected with the North Sea, and a chamber lock for sailing the Ringkøbing Fjord (Figure 9).

Facilities: Local diver, mobile crane, Sennebogen loading/unloading machine.

Main enterprises in the port area. At the Atlantic Sapphire Farm located in Hvide Sande Port area salmon are raised in a revolutionary Bluehouse™ – the equivalent of a Greenhouse where fish are given ideal conditions to thrive. Bluehouse™ Denmark – transformed salmon farming forever. State of the art Bluehouse™, located in Hvide Sande, was the first of its kind when built-in 2011. This commercial pilot facility demonstrated the ability to raise Atlantic salmon without the use of net pens in open water.

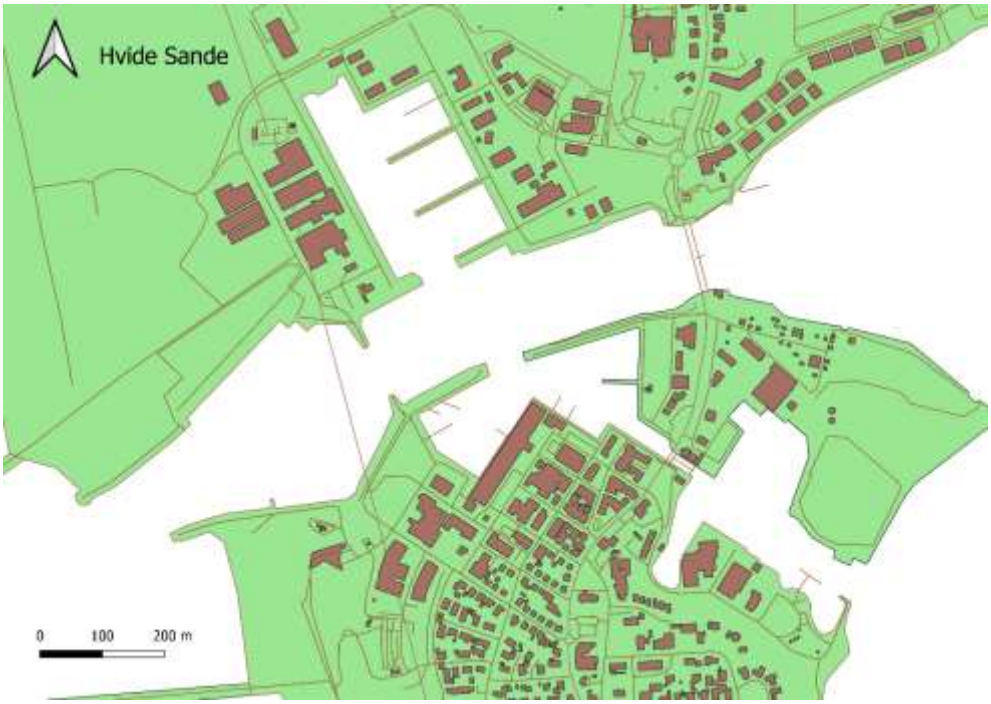

Figure 9. Port area of Hvide Sande

Source: Based on © OpenStreetMap authors.

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3.2.8. Korsør

Ownership and management: Korsør Port is owned by Slagelse Municipality and operated as a municipal enterprise.

Port outline: Korsør Port is located on both sides of the inlet to Korsør Nor. The port comprises Outer Harbour and Fishery Harbour, the actual harbour, which includes Old Harbour to the west from the Halsskov Bridge and Inner Harbour to the east from the bridge. Furthermore, the Naval Port in Outer Harbour is reserved for naval ships and is excluded from public access (Figure 10).

Facilities: There are two mobile cranes: max 42 t and max 6 t. Power and freshwater along most of the quays. Possibility to remove ship's sewage (sewage pumping), waste and old oil.

Main enterprises in the port area. Korsør Port is one of the main terminals of Aalborg Portland, which is the largest cement producing company in Denmark. It was established in Aalborg in the 19th century. Aalborg Portland ships four major products via the terminal in Korsør Port: grey cement, white cement, ready-mixed concrete and aggregates. In 2009 the Sinai White Portland Cement division became the biggest white cement integrated plant worldwide in terms of capacity. Since 2003, the company is a subsidiary of Cementir Holding S.p.A. In 2019, Aalborg Portland had 335 employees in Denmark.

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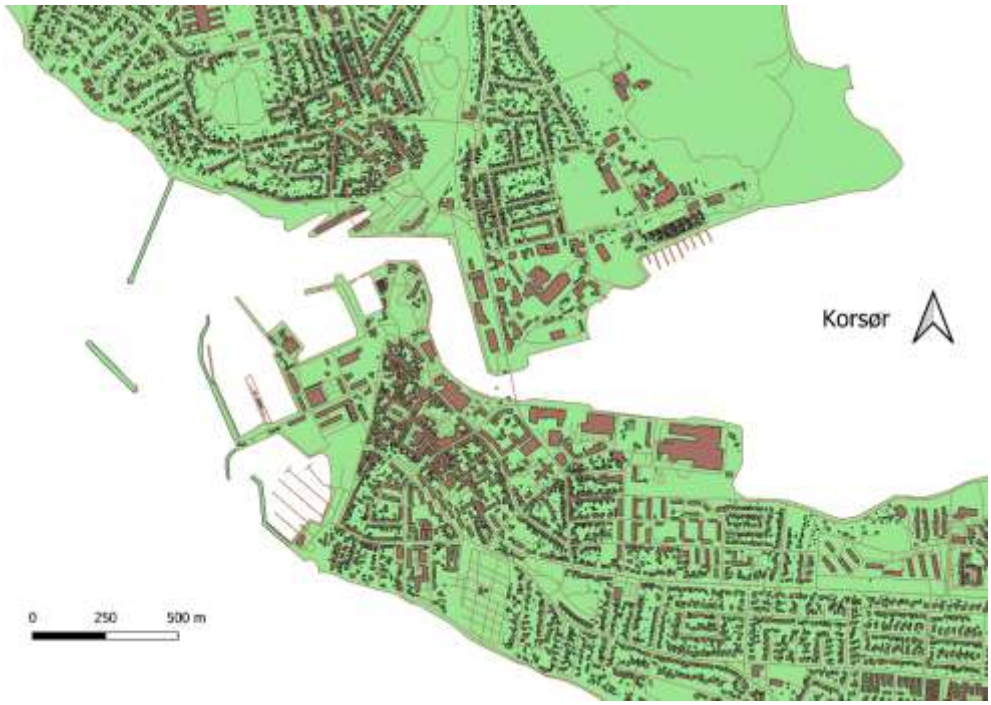

Figure 10. Port area of Korsør

Source: Based on © OpenStreetMap authors.

3.2.9. Næstved

Ownership and management: Næstved Port is a self-governing municipal port owned by Næstved Municipality.

Port outline: Næstved Port consists of many basins which in the direction from northeast to the southwest are the following: Western basin, Svajeb basin and Southern basin. The port is located deeply inland. A 4.5 NM long, navigation channel with a bottom width of 20 m leads through Karrebæksminde Harbour and Karrebæk Fjord; further on via the canal, where the bottom width is 16 m, to Næstved Port (Figure 11).

Facilities: Næstved Port can handle all types of shipping waste, oil, sewage, etc. There are two hydraulic unloading machines.

Main enterprises in the port area. Reiling Glasrecycling Denmark ApS has the leading location in Næstved Port. It is a recycling company specialising in various types of hollow glass and flat glass. It is a subsidiary of the Reiling Group, one of the most multi-faceted recycling specialists for glass, plastic, paper, wood and substitutes fuels in Germany. Reiling Glas-recycling Denmark ApS in Næstved Port applies new, innovative techniques continuously developing new options for usage and recycling in order to recycle valuable materials as efficiently as possible and create the ideal recycling chain possible. It is well integrated. In 2015, the commissioning of the first step of the glass recycling plant at Naestved Port took place.

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Figure 11. Port area of Naestved

Source: Based on © OpenStreetMap authors.

3.2.10. Nakskov

Ownership and management: Nakskov Port is a self-governing municipal port owned by Lolland Municipality.

Port outline: The port has berths for larger commercial vessels, but also has facilities for leisure boats at the Havnegade quay. Besides, Rosnæs beach has piers for leisure boats, among others. To the west, there is a small shipyard (Figure 12).

Facilities: Electricity and water connection on most of the quays. Part of the dock system reinforced for heavy-lift crane work. Mobile crane with 16 m outlay and fixed crane with 100 tonnes lifting capacity. Also, conveyor belts etc. for loading grain etc. Repair companies can be called – shipyard for vessels of up to 20 tonnes weight.

Main enterprises in the port area. Nakskov Mill Foods A/S dates back to 1898. It is a robust, innovative and loyal Danish manufacturer and partner within high-quality breakfast cereals. Over the years Nakskov Mill Foods A/S has supplied legendary breakfast products and are a manufacturer of Private Label breakfast cereals for the last 100 years, 90% of products are exported. Food Safety is one of the most critical focus areas in Nakskov Port, and production is approved according to the international and national standards. Nakskov Mill Foods A/S is part of the KOFF group, which is a family-owned holding company consisting of several Danish companies, with Kohlberg Bakery Group A/S as the largest company.

KOFF A/S has a total of about 1 000 employees.[10]

[10] Nakskov Mills Foods A/S - NMFoods.dk. https://nmfoods.dk/

East Metal A/S has its office at Nakskov Port, including responsibility for sales, project management and financial matters. The plants' capacity is managed concerning demand, which means that there are departments for small components, departments for serially-produced pieces, and departments for the final assembly of products. For the biggest structures, the plant in Nakskov is used, where structures up to 130 tonnes can be assembled. The Nakskov plant is located in the harbour. Therefore, there is direct access for disembarking.

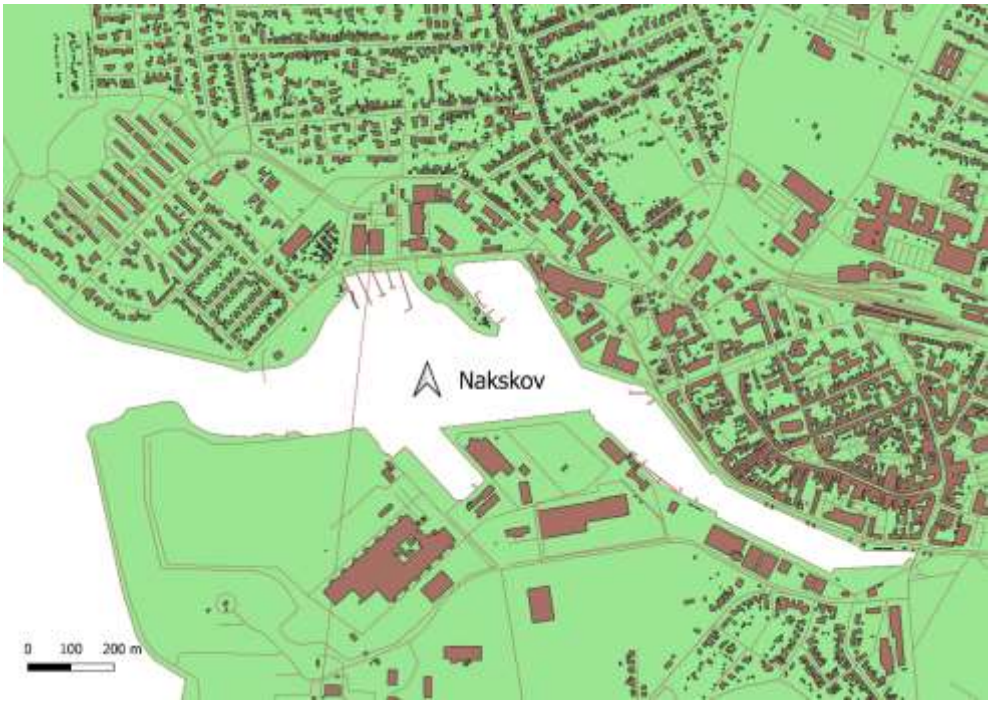

Figure 12. Port area of Nakskov

Source: Based on © OpenStreetMap authors.

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3.2.11. Nexø

Ownership and management: Nexø Port is owned and operated by Nexø Haven A/S.

Port outline: The port of Nexø consists of a one part reserved for cargo ships, rescue vessels and ships for repair and other part for fishing vessels divided into the following basins: Old Basin reserved for smaller fishing vessels/summer season guest boats and 1st, 2nd, 3rd, and 4th basin reserved for fishing vessels. Mooring poles and mooring rings are located at the quays and warp poles on the breakwater (Figure 13).

Facilities: Dry dock for vessels up to 54 m in length, 9.4 m in width and 3.7 m in depth. A ship lift with a lifting capacity of 650 tonnes weight is located at the southern part. Largest dimensions of vessels: length 50 m, width 9.75 m and draft 5.0 m. Ship-repair and storage of timber and iron for ship repair are at the port. There are machine and forge workshops in the harbour. There is a ferry connection to Poland.

Main enterprises in the port area. Activity in the harbour area has increasingly moved away from fish processing to be replaced by new businesses, stores, and restaurants. Nexø's services include various sports facilities. Nexø Shipyard in the heart of the harbour is converted into a skateboarding centre. Retail businesses in Nexø have benefitted from a growing number of tourists from the summer house developments to the south as well as from a reduction in facilities in the surrounding villages. There is a pleasant shopping area between the central square and the harbour.

Figure 13. Port area of Nexø

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3.2.12. Nykøbing (Falster)

Ownership and management: Nykøbing Falster Port is owned by the Municipality of Guldborgsund and operated by Guldborgsund Ports A/S.

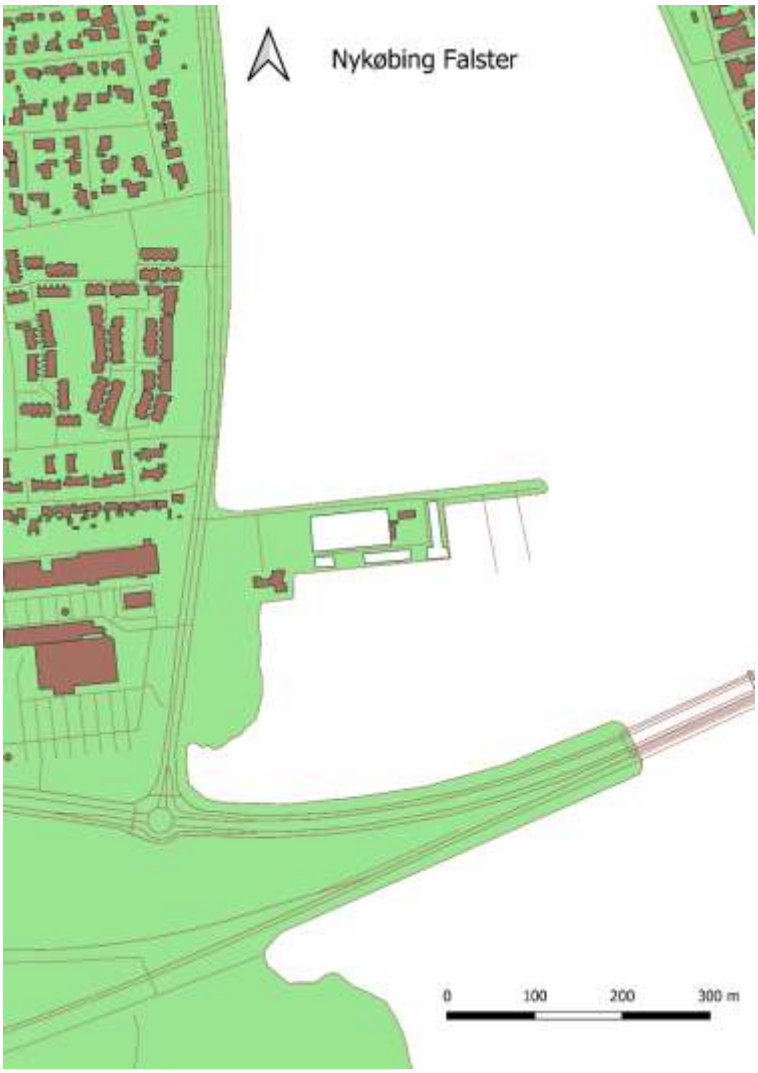

Figure 14. Port area of Nykøbing Falster

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Port outline: Nykøbing Falster Harbour is a commercial Harbour with a total of 1.2 km of the quay and an area of about 100 000 m^2. The port is 6.1 m deep. It has a quay facility adjacent to Guldborg Sound for larger commercial vessels. The largest vessels that can call the port are 129 m long and 20 m wide. To the north from the quay facility, there is a marina and a fishing port, which is managed by the Marina in Nykøbing F A.m.b.a., and there is a Southern Boat Harbour for dinghies and smaller yachts to the south from the quayside. A marina, managed by Toreby Sailing Club, is found in Sundby on the western shore of the Guldborg Sound. Furthermore, there is a pier facility, the Lergravs Bridge, for fishing vessels and leisure boats 1 km south of the city. Also, there is a marina at the Castle Bridge and a smaller marina called Lergravens Sailing and Fishing Club, located south of the Frederik IX Bridge towards the outskirts of the city (Figure 14).

Facilities: Several machine factories where steel vessels and machines can be repaired can be found in the port. The diver is also available at the harbour. There are 32-tonne and a 40-tonne mobile cranes, as well as two loads, each with a capacity of 350 tonnes/hour.

Main enterprises in the port area. DanGødning producer of liquid fertilisers has its terminal in the Nykøbing Falster seaport, along with the ones in Aalborg, Rødby and Fredericia. It is Northern Europe's largest producer of liquid fertiliser for agriculture, established in 1991 by a small group of private grocery merchants as an alternative to regular solid fertilisers. DanGødning has all types of fertilisers in the product range with all macro and micronutrients for all types of crops. Fertiliser from Dan Fertilizer is an environmentally friendly alternative because it uses nutritional by-products from oil refineries, incinerators and the pharmaceutical industry.

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3.2.13. Nykøbing (Mors)

Figure 15. Port area of Nykøbing Mors

Source: Based on © OpenStreetMap authors.

Ownership and management: Nykøbing Mors Port is owned by Morsø Municipality. The Mors Marina, located on the inside of the southern straight dock and in the former ferry port, is owned by the association MorsHavn A.m.b.a.

Port outline: Nykøbing Mors Port is a commercial port which consists of the Northern Port, the Mors Marina, the Fishing Port and the Southern Port (Figure 15).

Facilities: There is an electricity and fresh water at all quays and pontoons. Diesel for commercial and leisure vessels. The commercial port is operated by a crane. Diving assistance is also available.

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Main enterprises in the port area. There are no enterprises located at Nykøbing Mors Port. Holmes Slagter slaughterhouse has been converted into a butcher's shop. The Consol Solar Centre is adjacent to the port area. It had opened the first solar centre in 1978, and now there are more than 250 in Denmark, England, Scotland, the Czech Republic and Germany. The company still has its headquarters in Nykøbing M.

3.2.14. Orehoved

Ownership and management: Orehoved Port is owned by Guldborgsund Municipality and operated by Guldborgsund Ports A/S.

Facilities: Electricity and water are provided at the dock. There are 32-tonne mobile crane and 30 m wide ro-ro ramp.

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Figure 16. Port area of Orehoved

Source: Based on © OpenStreetMap authors.

Main enterprises in the port area. Getreide AG from Rendsburg, Germany has purchased storage facilities at Orehoved Port in 2011. The enterprise is gearing up for a rape and cereal intake at Lolland-Falster and Zealand. It established itself in the so-called Godshotellet Sjælland in the Port Area (Figure 16). The Orehoved warehouse is valid for buying canola and shipping it directly to Getreide AG's oil mill in Rostock. Here the enterprise already processes 500 000 tonnes of canola annually. The seed of own production is offered, as well as fertiliser and plant protection materials from the Orehoved warehouse to farmers in Lolland-Falster and Zealand.

Ardo A/S has its factory in Orehoved Port. Ardo A/S produces and markets a wide range of frozen vegetables, fruits, berries and vegetable-based dishes, both under the Frigodan brand and partly under private label. Of its production, ca. 80% goes for domestic sales and the remaining 20% for export.

3.2.15. Rødby

Ownership and management: Rødby Port is owned by Scandlines Danmark A/S.

Port outline: The port consists of Rødbyhavn Commercial Port, divided into Western Harbour and Northern Harbour, as well as Rødby Ferry Port for ferry connection to Puttgarden in Germany. For leisure boats, there is a limited number of berths in Western Harbour off the shipyard and partly on a pontoon bridge off the quay number 7 in Northern Harbour (Figure 17).

Facilities: There is electricity in Northern Harbour. Water can be provided at the quays. Diesel oil. Boatyard with bedding. Slipway. Machine shop. A 32-tonne mobile crane. Two grain elevators with a loading capacity of 90 tonnes/hour, but without unloading equipment. Two silos and weighing booths. Diving assistance from Nykøbing F.

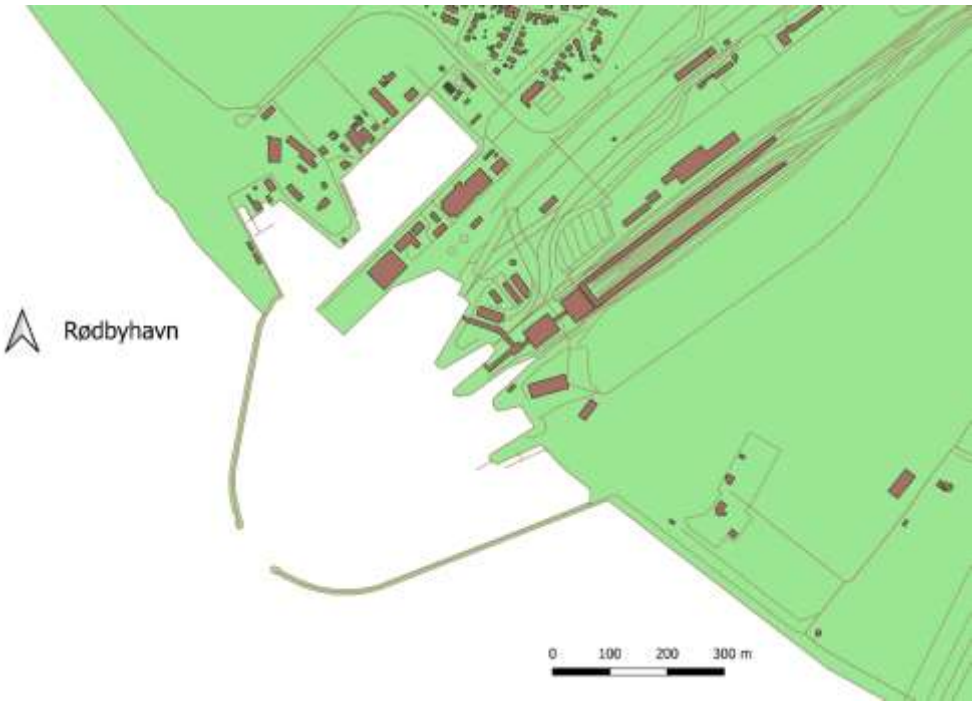

Figure 17. Port area of Rødbyhavn

Source: Based on © OpenStreetMap authors.

Main enterprises in the port area. Rødbyhavn Boatyard combines ship carpenters and ship media experts. In a light wood workshop, Rødbyhavn Boatyard works with traditional ship carpenters and joinery, and in the smithy, installations, renovation work and hydraulics are handled. Rødbyhavn Boatyard offers high-quality service and craftsmanship. It specialises in restoration and repair of wooden boats. The wood workshop is adjacent to the metal workshop. There is also a sawmill. Many Danish and German customers are keen to preserve the Danish wooden boat culture. In the smithery, welding tasks, as well as engine and machine repairs, are handled. In 2014, Rødbyhavn Boatyard established its sawmill so that it is now able to cut wood, e.g. planks, stiffen and cool picking up much oak in local forests. A dry dock can accept boats of about 23 m, and there is room for two boats

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at a time.

3.2.16. Skagen

Ownership and management: Skagen Port is a self-governing municipal port. Since the port was sold to Skagen municipality in 2001, Skagen Haven has been operating as an independent company. The port is managed by a seven-member directorate. With the 2007 administrative reform, the company became the property of Frederikshavn Municipality.

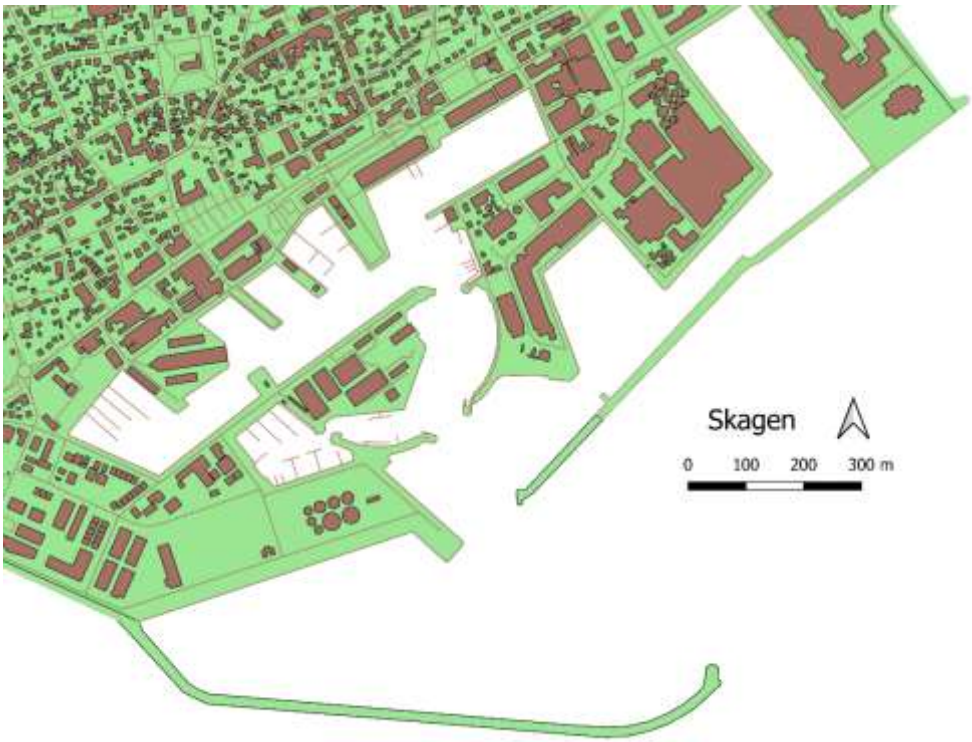

Figure 18. Port area of Skagen

Source: Based on © OpenStreetMap authors.

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Port outline: The port area consists of the following basins: Ydrebassin, Ydre Forhavnsbassin, West Harbor and Eastern Harbor. West Harbor consists of: Inner Forhavnsbassin, Bundgarnsbassin, Auktionsbassin, Mellembassin and Vestre Basin. Eastern Harbor consists of: East Basin I and East Basin II. Skagen Marinas manages the area between Gamle Pier and Pier 2 in the Middle Basin. Skagen Bådelaug and Skagen Sailing Club each manage part of the Bundgarns basin. Skagen Bathing Club and Skagen Sailing Club each manage part of the Bundgarnsbassin. Skagen is also known for its fishing port. The port of Skagen has operated annually by approximately 1 000 fishing vessels and 550 merchant vessels, as well as a growing number of cruise calls. The cruise ship quay is used to a maximum draft of 11.0 m (Figure 18).

Facilities: Shipyard with bedding and dry dock for ships of up to ca. 125 metres in length. Four single-crane mobile cranes up to 30 tonnes and motor vehicle repair workshops. Local divers are available. As part of the construction of a fish terminal from 2007 to 2008, the old auction hall was renovated, and a cooling system with a secured cold chain was installed. At the same time, work began on a ro-ro ramp and a 170 m long quay in the outer Harbour basin, which is designed for 9 m deep ships. The latest expansion was completed in spring 2015 since then cruise ships can call at the port.

Main enterprises in the port area. Still about 25% of the total economic value added of Skagen Port is generated by deepsea fisheries and fish processing sector. Skagen is the leading fishing port in Denmark. There are numerous fish processing enterprises in the fishing harbour (e.g., Skaggerak Pelagic A/S, Pelagic Skagen A/S, Scandic Pelagic A/S, Larsson Werner Fiskeeksport A/S etc.).

Karstensens Skibsværft A/S shipyard is among the city's largest commercial enterprises. It has existed since 1917 and is one of the few Danish shipyards which is still building new ships. Karstensens Skibsvaerft A/S can be characterised as an

efficient shipyard facility equipped to present-day standards. The total number of employees is currently about 375. The yard can offer new building of most vessel types up to approx. – 135 m in length. Karstensens Skibsvaerft A/S can offer any kind of ship repair services, and have dry dock facilities and slipways up to 135 m / 7.500 tonnes.[11]

Danish Yachts A/S is another shipyard in Skagen Port which is a builder of motor yachts and both classic and high-performance sailing yachts ranging from 30 to 40 metres. Operating out of Skagen, Denmark, superyacht builder Danish Yachts specialises in building advanced composite vessels that are lightweight and fuel-efficient. Danish Yachts designs superyachts using state-of-the-art materials and technologies while following sustainable manufacturing practices in its shipyards.

3.2.17. Skive

Ownership and management: Skive Port is owned by Skive Municipality.

Port outline: Skive Port consists of a commercial port (South harbour and Fjord quay), and a fishing port (further south from the South harbour) (Figure 19).

Facilities: Diesel and gasoline (by car) are available. There is a 62-tonne mobile crane. Diving assistance is available.

Main enterprises in the port area. Large areas of the port are leased to DLG Central and Western Jutland, a regional subsidiary of DLG, a nation-wide agricultural import/export enterprise. There is also a small leisure shipyard owned by Lars Klok located at the southern end of the port of Skive. Skive Sten & Grus A/S, a stone crushing enterprise producing granite sheaves, sand, gravel and paving, is located at the northern end of the port.

[11] Welcome - KARSTENSENS SKIBSVÆRFT A/S. https://www.karstensens.dk/?news_id=103

Figure 19. Port area of Skive

Source: Based on © OpenStreetMap authors.

3.2.18. Søby

Ownership and management: Søby Port A/S is a self-owned institution.

Port outline: The port consists of three basins with a marina in the eastern basin, a fishing port with ferry docks in the southern basin and a shipyard in the western basin (Figure 20).

Facilities: Large Harbour area with a shipyard. The shipyard crane with a lifting capacity of up to 34 tonnes. There are three dry docks with the following dimensions: 75 m x 13 m x 3.2 m; 85 m x 15 m x 3, 6 m; 115 m x 24 m x 6 m. All repairs on vessels and engines are done. There is a fetching bed for ships up to 50

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GRT: tow boat, diving assistance.

Main enterprises in the port area. Søby Shipyard is a fund-owned shipyard located in Søby on Ærø. The shipyard has about 150 people employed (2019), of which 75 are own employees, and the sub-contractors are, among others, the local Nautic Wood and Søby Skibselektro. Søby Shipyard builds naval vessels for the Navy. The shipyard's main activities are ship engine repairs, maintenance and installations, as well as new construction, rebuilding, retrofitting and ship repairs. Besides, the shipyard supplies steel structures for ships and the offshore industry, and also carries out travel work within engine repairs, pipework and more. The engine department specialises in repairing all engine types and propeller propulsion systems.

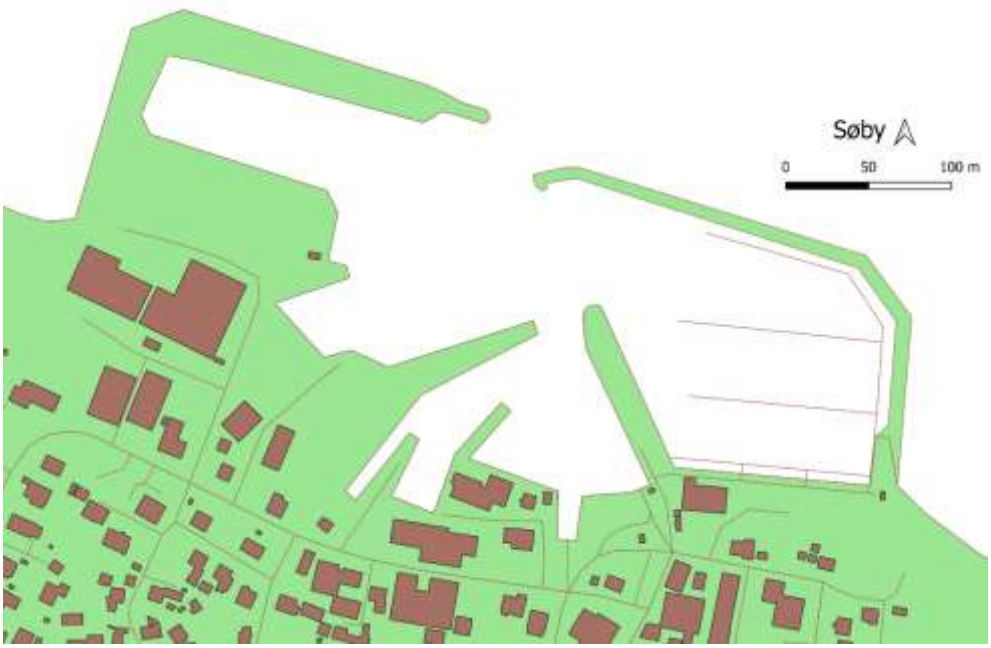

Figure 20. Port area of Søby

Source: Based on © OpenStreetMap authors.

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3.2.19. Sønderborg

Ownership and management: Sønderborg Port is owned by Sønderborg Municipality.

Port outline: The port is located in the Als Sound and is divided by the King Christian X Bridge into the northern and southern harbours (Figure 21). The northern harbour is deeper (up to 9.5 m maximum permissible draft) while the southern harbour is shallower (up to 6.5 m maximum permissible draft) and service mainly fishing trawlers. A large marina is located on the Sønderborg Bay outside of the main harbour area.

Facilities: Electricity and water are available at the quays. Diesel tank facility on the fishing dock.

Main enterprises in the port area. Despite the huge maximum permissible depth of 9.5 m, both, southern and northern parts of Sønderborg Port seem void of economic development. According to Denmark's Statistical Office, since 2014, the port has not received any ships. A Sønderborg-based global ICT company Hansen Technologies Denmark A/S has its headquarters in the northern harbour area.

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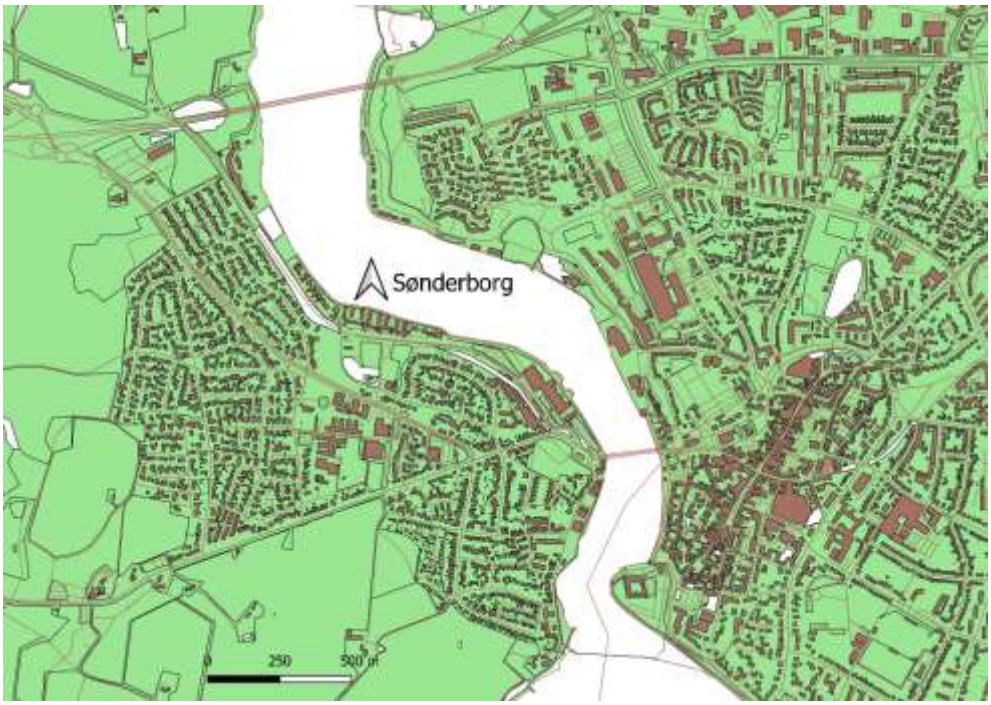

Figure 21. Port area of Sønderborg

Source: Based on © OpenStreetMap authors.

3.2.20. Struer

Ownership and management: Struer Port is owned and operated by Holstebro and Struer municipalities.

Port outline: Holstebro-Struer Port is a modern commercial harbour, which on an has a capacity for service of up to 1 000 cargo ships, with a collective cargo volume of 1 million tonnes. The port consists of the following basins: Eastern Harbour, Oil Harbour, Old Harbour, Fishing Harbour and Marina (Figure 22).[12]

[12] Traffic Harbour - Holstebro-Struer Harbour. http://struerhavn.dk/en/traffic-harbour/

Facilities: Electricity, water and supplies at the quays. Fuel from tankers. Diesel at the south quay in Old Harbour. In the western part of the Harbour, there are shipyards for building wooden ships up to 100 GRT, a workshop and repair shipyard for wooden and iron ships. In addition, there is a taller quay for vessels of up to 150 GRT, length 30 m, width 7.5 m and 170 tonnes of self-weight, and a smaller quay with side draft for vessels up to 10 tonnes. Diving assistance is available. A 50-tonne mobile crane with hook, 32-tonne mobile crane with hook and a 40-tonne crane.

Main enterprises in the port area. Large areas of the port are leased to DLG Central and Western Jutland, a regional subsidiary of DLG, a nation-wide agricultural import/export enterprise. It owns a large silo and a feed production company with a capacity of at least 6 tonnes per hour in the port area. DanDuck A/S, which is Denmark's only duck slaughterhouse, is located at the Eastern harbour of the port area of Struer. Besides ducks, the enterprises' culls, processes and exports ducks, hens, chickens, geese and other birds of the world, both from their production and from the farms in the region and beyond.

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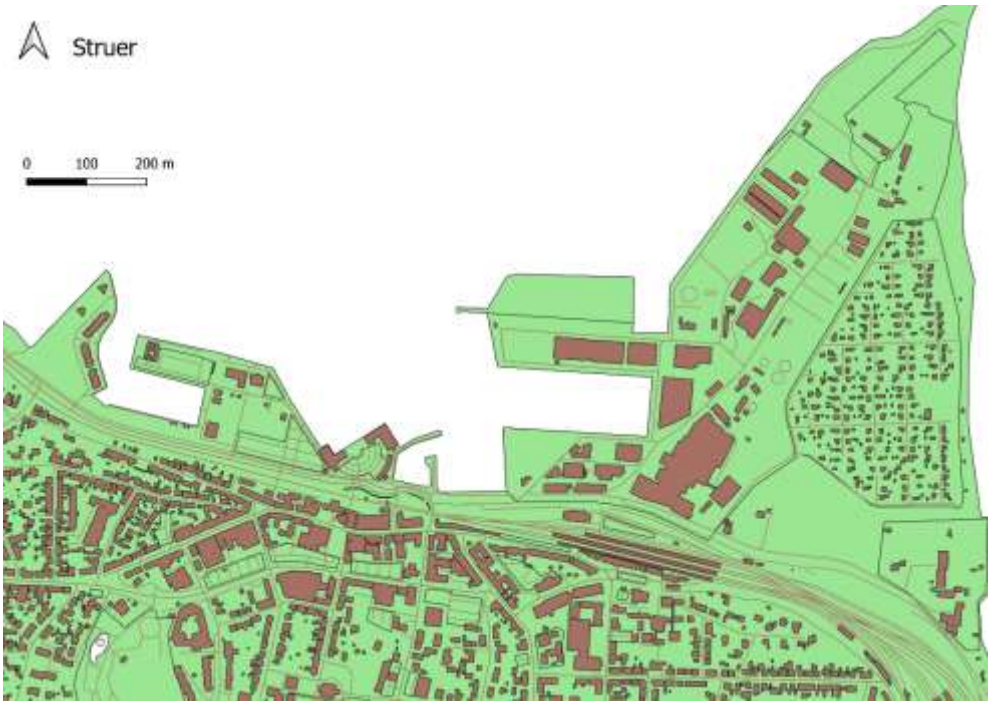

Figure 22. Port area of Struer

Source: Based on © OpenStreetMap authors.

3.2.21. Stubbekøbbing

Ownership and management: Stubbekøbing Port is owned by Guldborgsund Municipality.

Port outline: Stubbekøbing Port consists of three basins: there is a fishing port in the centre, the New Port to the west from it and a marina to the east. In the fishing port and the New Port, there are berths for commercial vessels. On the western side of the fishing port, there is also a ferry terminal from which there is a ferry connection to Bogø. The New Port is protected by a breakwater (Figure 23).

Facilities: A small dry dock for ships up to 15 tonnes of total weight. Mobile crane for 18 tonnes. Diving assistance. Engine repair can be requested. Electricity and

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water are provided on quays and bridges. Diesel can be bunkered in the fishing port. Tanker truck can be requested.

Main enterprises in the port area. Two machine workshops with blacksmiths for various works on iron and aluminium vessels belong to the port-based enterprise Havens Maskin-værksted Stubbekøbing ApS owned by Stubbekøbing Port. Wooden shipbuilding, as well as upholstery for ships of up to 80 tonnes total weight, can also be offered there. Timber for wooden vessels is also available.

Figure 23. Port area of Stubbekøbing

Source: Based on © OpenStreetMap authors.

3.2.22. Thisted

Ownership and management: Thisted Port is owned by Thisted Municipality.

Port outline: Thisted Port consists of three basins: Eastern Harbour, Commercial Harbour and the Marina (Figure 24).

Facilities: A workshop and a 5-tonne crane.

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Main enterprises in the port area. Thisted Port hosts Tican Fresh Meat A/S, one of Denmark's most advanced pig slaughterhouses integrated with meatpacking and processing units in the port area. Tican Fresh Meat A/S is an international food company with the production and sale of fresh and frozen pork to retail and industrial customers. It is the Danish subsidiary of Tönnies Group. It has an annual output of 3.4 million slaughtered pigs which make Tican Fresh Meat A/S Denmark's second-largest slaughterhouse.

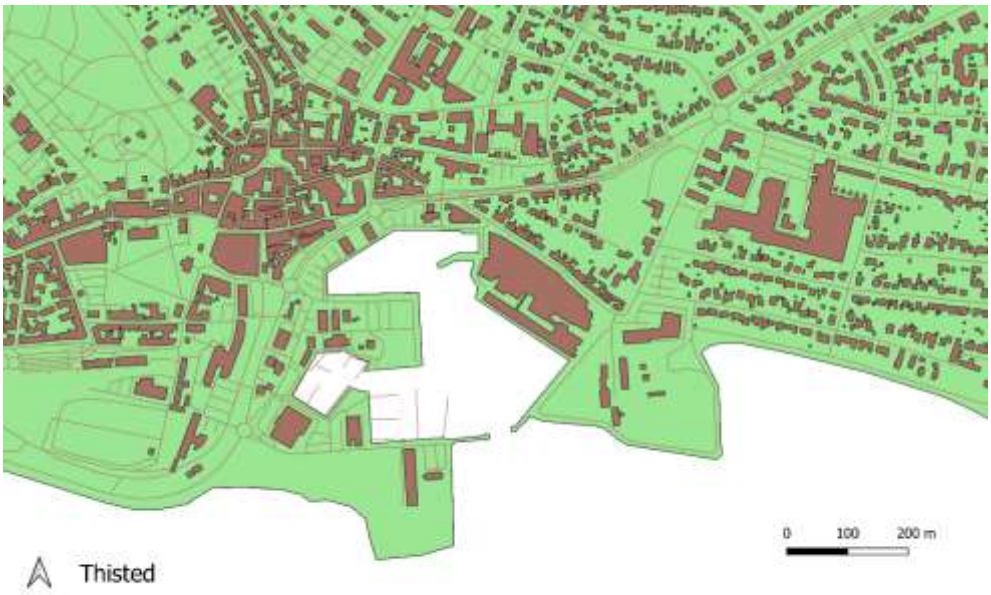

Figure 24. Port area of Thisted

Source: Based on © OpenStreetMap authors.

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3.2.23. Vordingborg

Ownership and management: Vordingborg Port is owned by Vordingborg Municipality.

Port outline: Vordingborg Harbour has the quay facilities located on the northern and western side of Masnedø Island and to the west of the Masnedsund Bridge. The quay facilities are used exclusively for commercial shipping (Figure 25).

Facilities: There are four bridge weights (60 tonnes), two mobile cranes (400 tonnes/hour), rubber joints, mini loader and sweepers. There are self-service water and electricity booths. Towing and diving services are available at the port. The harbour has experienced a rapid expansion of facilities during the last five years, which brought substantial changes.

Main enterprises in the port area. Large areas of the port are leased to DLG, a nation-wide agricultural import/export enterprise. DLG has established a joint venture with Copenhagen Merchants Group under the name Masnedø Bulk Terminal (MBT) owning a grain silo and an agricultural export terminal. Yara Danmark A/S, importer of fertilisers is also well-established in the port area.

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Figure 25. Port area of Vordingborg

Source: Based on © OpenStreetMap authors.

3.2.24. Årøsund

Ownership and management: Fishing and ferry port of Årøsund are owned by Haderslev Municipality, Årøsund Marina is owned by Årøsund Marina A.m.b.a.

Port outline: Årøsund Port consists of three basins; the first one, Årösund Harbour, is intended for small boats and fishing trawlers. On the southeast side of the south pier is a berth for fishing and freight vessels. The ferry berth may only be used for the ferry crossing Årøsund-Årø. The marina is located on the west side of the fishing port (Figure 26).

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Facilities: A workshop and a 20-tonne crane in a marina. Smaller mast crane. There is a place to dispose waste and bunker the vessel. Diving assistance can be requested – ferry connection to Årø.

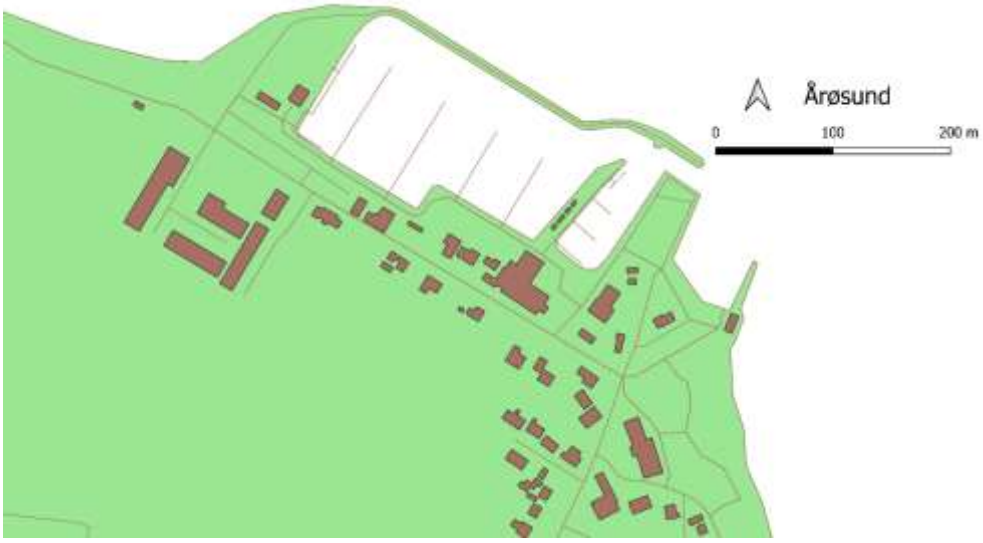

Figure 26. Port area of Årøsund

Source: Danish Port Navigation Guide.

Main enterprises in the port area. Årøsund Port hosts AquaProduction A/S, one of Denmark's most advanced rainbow trout slaughterhouses integrated with a processing unit in the port area. Over 5 000 t of rainbow trout are slaughtered in Årøsund annually. When the fish are slaughtered, they are typically about three years old and raised in the nearby aquaculture facilities. The fish from Årøsund are sold on five different continents.

Årøsund Bådebyggeri og Bedding A/S is a small yard with proud traditions and some of the best boat builders in the industry. It is close to the marina, in the old fishing port. The enterprise offers both boat builder and ship carpenter work is

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done according to the best craft traditions. Årøsund Bådebyggeri og Bedding A/S has great expertise in repairing and maintaining large and small wooden boats offer all services within traditional boatbuilding.

3.3. Germany

3.3.1. Brake

Ownership and management. The seaport of Brake is owned by the federal state of Lower Saxony and operated by the state-owned port operator Niedersachsen Ports GmbH & Co. KG.

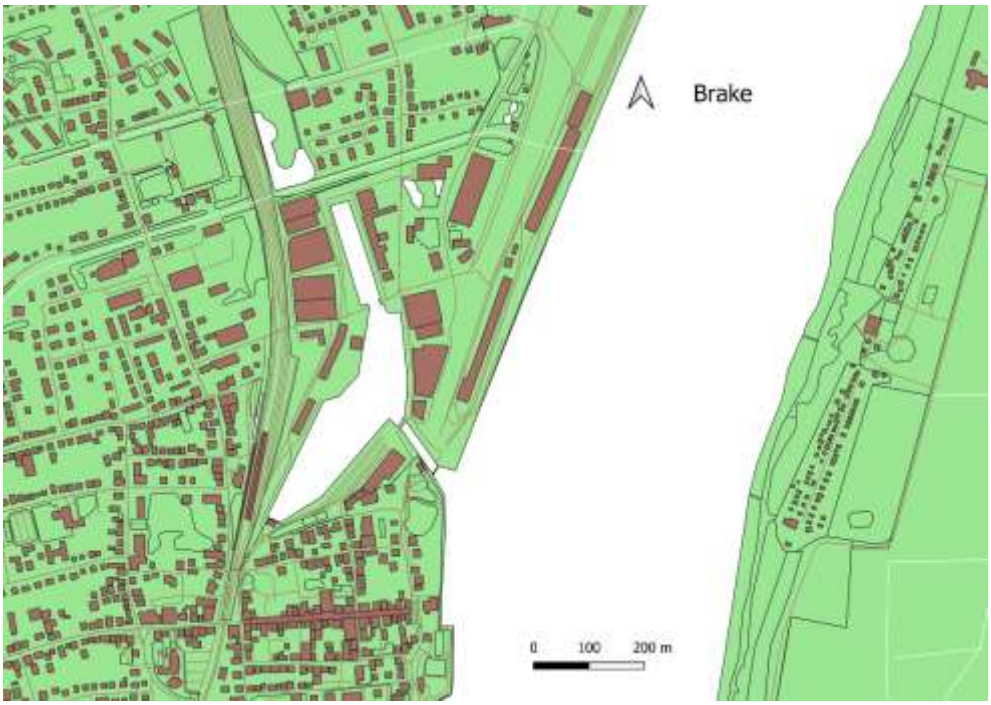

Figure 27. Port area of Brake

Source: Based on © OpenStreetMap authors.

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Port outline. The seaport of Brake is located on the left bank of the Weser river, about 26 km above its estuary. The port is famous for a more than 2 km long river pier with the state-of-the-art port handling and silo facilities. There is an inner port in the south-facing the city centre with a water surface of ca. 4.4 ha and a quay length of ca. 1 000 m., which is used by coastal motor and inland waterway vessels as well as leisure boats. A sea lock with a chamber length of 95 m connects the inner port with the Weser river (Figure 27).

Main enterprises in the port area. The port of Brake hosts J. MÜLLER Weser GmbH & Co. KG, which is one of the largest port transhipment companies in Lower Saxony. At the seaport of Brake, it has the largest contiguous silo system in Europe with storage capacities of 550 000 tonnes. The daily transhipment capacity is 200 000 tonnes, which is also the highest in Europe. State-of-the-art handling and storage facilities are also suitable for such cargo like iron and steel or even complete wind turbines (on- and offshore) and industrial plants.

3.3.2. Büsum

Ownership and management. The seaport of Büsum is owned by the federal state of Schleswig-Holstein and since 2019 is operated by Development Company Brunsbüttel mbH whereas the marina is managed by Büsum Sailing Association.

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Figure 28. Port area of Büsum

Source: Based on © OpenStreetMap authors.

Port outline. The seaport of Büsum is located on the North Sea coast between the mouths of the Elbe and the Eider. The port extends over a total area of ca. 190 000 m². It consists of three basins: the northern, the central and the southern one, which is used by leisure boats. The usable quay length is 2 500 m. There is also a ferry terminal. The marina offers around 100 berths; 80 of these are usually occupied by members of the Büsum Sailing Association, which also manages the docking facility (Figure 28).

Main enterprises in the port area. The fishing industry plays an essential role in the port of Büsum. Crab fishing is characteristic of the townscape, albeit with diminishing economic importance. Two Dutch companies, Heiploeg BV, which also bought the former Büsumer fishing cooperative, and Klaas Puul BV, are the largest crab buyers in the port of Büsum. The two companies now control up to

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90% of the crab market. The most important company for cargo handling in Büsum is J. Stöven KG. It operates silos for storage and a plant for the production of fertilisers and animal feed. Due to the local conditions and convenient location, the port of Büsum could be ideally positioned as a supply port for offshore wind farms.

3.3.3. Cuxhaven

Ownership and management. The Cuxhaven port is owned by the federal state of Lower Saxony and operated by the state-owned port operator Niedersachsen Ports GmbH & Co. KG Cuxhaven branch. The port company CuxPort GmbH, a subsidiary of Rhenus AG & Co. KG (74.9%) and the Hamburg-based HHLA (25.1%), operates the universal CuxPort terminal.

Port outline. The total area of the port is 319 ha, of which 231 ha is land area and 88 ha is water area. There is a multi-purpose handling facility with a total of 3 berths on a total quay length of 840 m, whereby a fourth berth is still being planned, and the construction is to be implemented at short notice. The terminal also has a heavy-duty platform with 85 000 m^2, which can be used to load tonnes of offshore elements directly onto the ship. Besides, there are handling and equipment facilities for the handling of general cargo, automobiles and bulk goods in the America port. Also, there are two berths for ro-ro handling on the Elbe. Other parts of the port are the new fishing port with equipment quay for fishing and offshore supply vessels and crew change vessels. The Cuxhaven offshore base with six berths (some of which are jack-up capable) is particularly important for handling heavy and large-volume components of the offshore wind energy industry (Figure 29).

There are following piers and handling facilities in the Cuxhaven port:

- Europa quay (length: 840 m, depth: 15.80 m): 1 container bridge, 1 ro-ro feeder (star ramp), 1 ro-ro feeder (star and quarter ramp), 4 reach stackers,

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1 mobile crane (100 t), gantry crane up to 600 tonnes, heavy-duty pier up to 90 t / m².

- America port: Humber quay (length: 120 m, depth: 7.00 m): 1 mobile crane (100 t). CuxCargo quay (length: 120 m, depth: 6.50 m), Emperor Quay (length: 260 m, depth: 6.00 m): 1 floating dock; Newer Lenz quay (length: 150 m, depth: 6.50 m); Older Lenz quay (length: 250 m, depth: 7.00 m).
- Steubenhöft quay (length: 400 m, depth: 14.00 m) with 1 ro-ro ramp and Lübbert quay (length: 290 m, depth: 8.50 m).
- New fishing port (quay length: 2,815 m, depth: - 9.00 m): lock (L 190 m, W 24 m), 2 rail cranes, 1 handling crane, 1 handling bridge for bulk goods. Old fishing port (length: 1,210 m, depth: 5.50 m): lock (L 190 m W 24 m). Old ferry port (length: 110 or 275 m, depth: 6.00 or 12.00 m), 1 ro-ro ramp.

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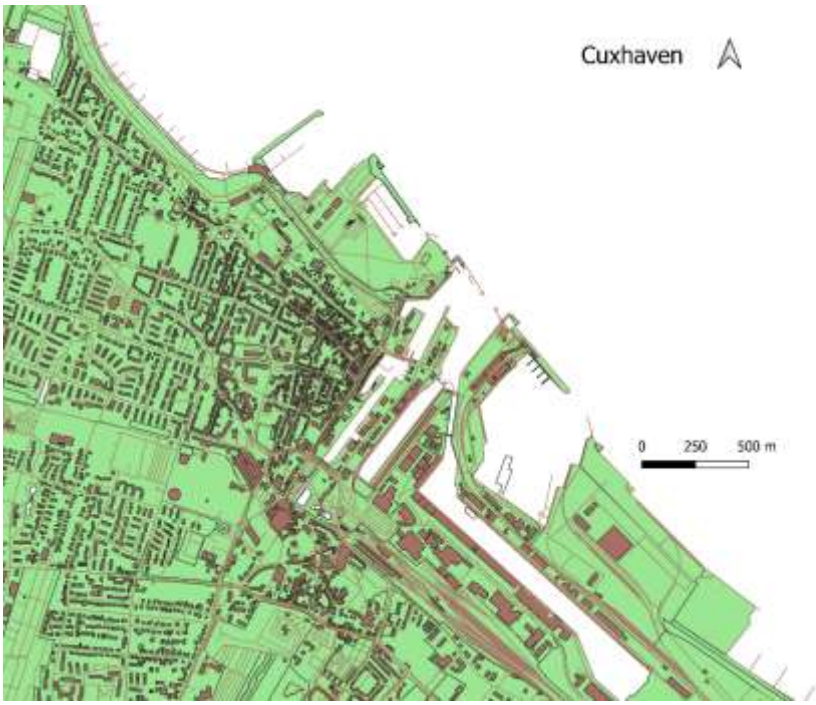

Figure 29. Port area of Cuxhaven

Source: Based on © OpenStreetMap authors.

Main enterprises in the port area. There are 35 fish processing companies with ca. 1 000 employees in Cuxhaven. The opening of the deep-water sea transhipment terminal of CuxPort in 1997 was crucial for further economic development of the city of Cuxhaven. The main sectors are ro-ro ferries, transportation of new vehicles, loading of containers and components for offshore wind farms.

Mützelfeldtwerft GmbH & Co. KG is a shipyard in Cuxhaven. It is a member of the Heinrich Rönner Group since July 2013 and specializes in building smaller ships: tugs, floating cranes, fishing vessels and cargo ships. From 2007 to 2010, the Mützelfeld shipyard built Germany's most potent anchor-handling tugs, the Uranus and Orcus. In 2017, the shipyard merged with the repair yards Bredo and German Dry Docks based in Bremerhaven to form a group of companies whose legally

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independent companies operate together on the market under the name Bredo Dry Docks in order to be able to use synergy effects.

3.3.4. Eckernförde

Ownership and management. Eckernförde Port is owned by Eckernförde municipality and managed by a municipal infrastructure enterprise.

Port outline. The Baltic Sea port Eckernförde is located in the Eckernförde Bay, about 25 kilometres north of Kiel. With a quay length of 900 metres, the port offers 137 berths, mainly for smaller boats. In Eckernförde there are four basins. The Eckernförde city harbour – usually only referred to as a harbour – serves among other things as a fishing harbour and a marina. At the port entrance, there is the outer harbour – a marina for leisure boats (Figure 30).

Main enterprises in the port area. The port's main handling business is fish, grain and fertilizer handling. There are a privately-owned small-scale yacht building and repair yard "De lütte Werft" which specializes in all kinds of repair works for yachts and leisure boats.

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Figure 30. Port area of Eckernförde

Source: Based on © OpenStreetMap authors.

3.3.5. Elsfleth

Ownership and management. Elsfleth Port is owned by Elsfleth municipality and managed by a municipal infrastructure enterprise.

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Figure 31. Port area of Elsfleth

Source: Based on © OpenStreetMap authors.

Port outline. Elsfleth Port is located at the confluence of the Weser and Hunte federal waterways, which are managed within the scope of the German Maritime Shipping Code. The commercial port is above the Hunte barrier while the marina with ca. 150 berths are located below the Hunte barrier in the tidal zone of Weser (Figure 31).

Main enterprises in the port area. Elsflether Werft AG is a shipyard located on the Hunte river just above the Hunte barrier at the confluence of Hunte and Weser. At the end of October 2019, the insolvent Elsflether shipyard was bought by the Fr. Lürssen Werft GmbH & Co. KG shipyard from Bremen. According to the Creditors' Committee, Lürssen paid EUR 3.57 million for the shipyard with 130 employees. In April 2020, Lürssen announced that it wanted to close the Elsflether

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shipyard in the same year because the location was not considered to be sustainable.

3.3.6. Flensburg

Ownership and management: Flensburg Port is owned by Flensburg Municipality, whereas the operator is Flensburger Hafen GmbH.

Port outline: The port of Flensburg is located at the end of the Flensburg Fjord. There is one basin with Harnis and Power plant quays (total length 915 m, ISPS-certified). In addition to the municipal port, there is a privately owned marina with 168 berths on the east coast of the fjord, which is operated by "Im-Jaich Wasserwelten" GmbH (Figure 32).

Main enterprises in the port area. Currently, three large innovative enterprises are in the port area of Flensburg. One is Flensburger Fahrzeugbau Gesellschaft mbH (FFG). It is a medium-sized structured company active in the field of defence technology repair, vehicle construction and vehicle retrofitting. Another one is Flensburger Schiffbau-Gesellschaft mbH (FSG) shipyard.

Flensburger Schiffbau GmbH & Co. KG shipyard is the largest enterprise located in the municipal port area. Since its foundation in 1872, the shipyard staff has designed and built more than 750 ships, some of which of unique design and complexity the like of heavy submersible lift, seismic, well intervention, ro-ro or strategic naval support. It focuses on the design and construction of tailor-made designs for those shipowners and operators that require high reliability and optimization of their ship operations.

Robbe and Berking Classics GmbH & Co. KG is a yet another, lesser shipyard focusing on building classical sailing boats and their replicas. The shipyard is restoring classical motor and sailing yachts and building replicas of particularly beautiful classics that have been lost. With attention to detail, great passion and at

fair prices, it has found its competitive niche on a tough shipbuilding market. Since summer 2011, the shipyard closely co-operates with traditional yacht broker Baum & König arranging tailor-made insurance for unique ships and their sale.

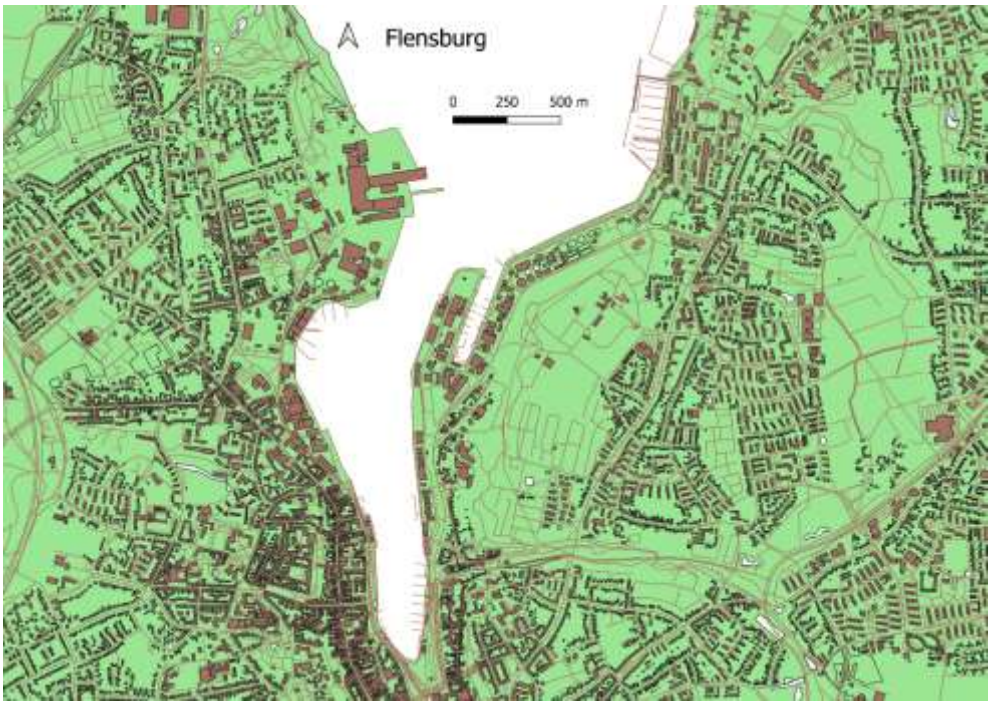

Figure 32. Port area of Flensburg

Source: Based on © OpenStreetMap authors.

3.3.7. Glückstadt

Ownership and management. Glückstadt Port is owned by the federal state of Schleswig-Holstein, and its operator is Glückstadt Port GmbH & Co. KG owned by SCHRAMM Group. The state port of Glückstadt was leased by the state of Schleswig-Holstein in 1995 to Glück-Stadt Port GmbH, a subsidiary of the Schramm Group, which now operates the port. Therefore, Glückstadt Municipality

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is not a partner in port ownership or management, which is a not very typical case for inland waterway ports.

Figure 33. Port area of Glückstadt

Source: Based on © OpenStreetMap authors.

Port outline. Glückstadt harbour is located on the Lower Elbe. It has two basins: the outer one is outside the lock, and the inner one is protected from tides by the lock. The outer basin (quay length 470 m, depth 6 m) is equipped with a heavy-duty pier so that heavy goods and project cargo can be handled. In the past, towing winches and large components for industrial and wind power plants with unit weights of up to 160 tonnes were loaded in the port – but also the handling of heavy goods with larger unit weights is possible. Also, the outer port is equipped with the latest equipment for handling containers. The inner port is only of interest

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for leisure craft (Figure 33).

Main enterprises in the port area. The Yachtwerft Glückstadt GmbH & Co. KG combines traditional craftsmanship with the latest technology and first-class materials. From boat-building to yacht refitting – the shipyard offers all-round service from a single source for yachts of all types. It is located in the inner harbour of Glückstadt protected from tides. Years of expertise and an experienced team of boat builders, high-tech experts, carpenters, painters and engineers are available at all times, likewise, a classic "Gunilla" shipyard tugboat. The shipyard is known internationally for being Germany's leading luxury yacht repair enterprise which can deal with the refitting of any type of luxury leisure boats – from hull fitting works to the complex works of engine repairing.

3.3.8. Heiligenhafen

Ownership and management. The port of Heiligenhafen is owned and operated by the City of Heiligenhafen.

Port outline. The commercial harbour of Heiligenhafen is relatively small with just one 395-m long quay and depth of 4.8 m. However, there is a marina near the city centre with ca. 1 000 berths (Figure 34).

Main enterprises in the port area. The port's main handling business is fish, grain and fertilizer handling. There are a privately-owned small-scale yacht building and repair yard "Göttsch Hans Bootswerft" which specializes in all kinds of repair works for yachts and leisure boats.

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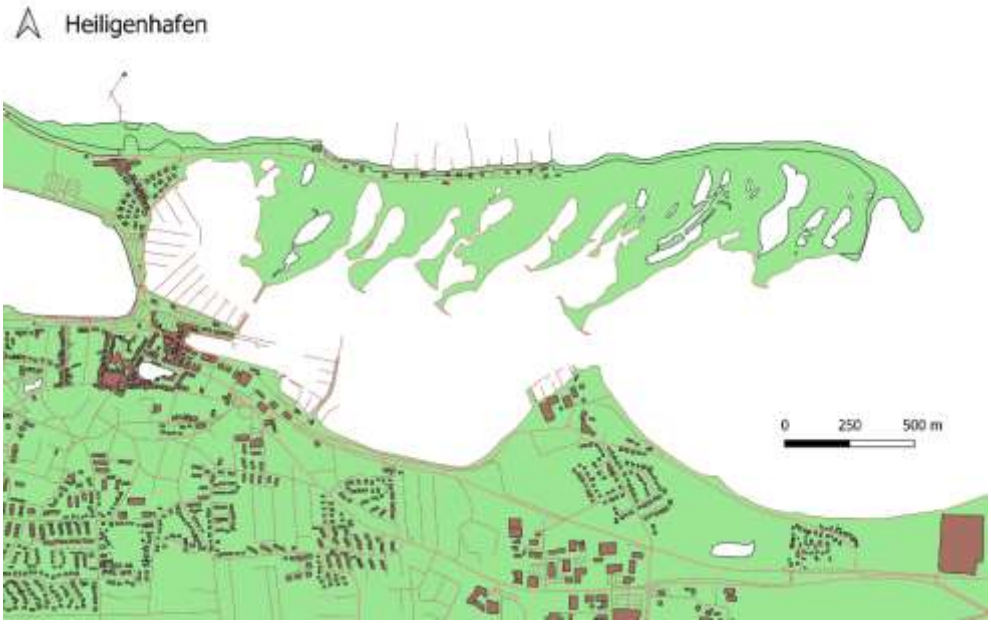

Figure 34. Port area of Heiligenhafen

Source: Based on © OpenStreetMap authors.

3.3.9. Husum

Ownership and management. The port is owned by the State of Schleswig-Holstein and is operated by the State Agency for Coastal Protection, National Park and Marine Protection Schleswig-Holstein. The port facilities are operated by ATR-Landhandel GmbH & Co KG and the Hauptgenossenschaft Nord AG.

Port outline. The port of the city of Husum is divided into two areas, the inner port and the outer port. While the inner port in the city centre is only used for leisure boats, the outer port of Husum forms the economically used part of the port. The quay length is 2 000 m of usable length (private facilities: 1 100 m) (Figure 35). The land area is 120 000 m². Water depth is 4.20 m.

Main enterprises in the port area. Commercial transhipment companies from the

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grain and animal feed sector – Hauptgenossenschaft Nord AG and ATR-Landhandel as well as a shipyard Husumer Dock und Reparatur GmbH & Co. KG (HDR) is located on the northern and southern banks of the outer harbour. HDR is the only repair yard on the North Sea coast of Schleswig – Holstein and of great importance for the passenger shipping of the island and Hallig shipping companies. It specializes in ship repair. The scope of services includes all ship repair work such as steelwork, interior fittings, mechanical engineering, pipework, painting, electrics and tank cleaning.

Figure 35. Port area of Husum

Source Based on © OpenStreetMap authors.

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3.3.10. Kappeln

Ownership and management. Kappeln Port is owned and operated by Kappeln municipality.

Port outline. The Kappeln harbour lies on the Schlei estuary and is ca. 7 km away from the Baltic Sea by water. It is a relatively small harbour with just one 300-m long quay and depth of just 3 m. The bridge divides the port into the northern and the southern basins with all the commercial activities located in the northern basin. There are two marinas in the Schlei river within Kappeln – the northern one with ca. 160 berths and the southern one with ca. 200 berths (Figure 36).

Main enterprises in the port area. The core function of the port is to serve as a fishing port and a marina. Also, a modest passenger and freight traffic is serviced. In addition to a small port company, Kappeln has several companies that serve to maintain and repair the leisure boats. Schiffsmotoreninstandsetzung & Service Kiesow GmbH is a small-scale repair workshop which specializes in all kinds of repair works for leisure boat engines, including the ones for luxury yachts.

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Figure 36. Port area of Kappeln

Source: Based on © OpenStreetMap authors.

3.3.11. Neustadt in Holstein

Ownership and management. Neustadt Port is owned by Neustadt Municipality and operated by a municipal enterprise of communal services "Stadtwerke Neustadt in Holstein". The southern marina is operated by Ancora Marina GmbH & Co. KG.

Port outline. The port of Neustadt in Holstein is located in the southwestern part of the Bay of Lübeck and is ca. 30 km from Lübeck. It consists of two basins – the northern one and the southern one. However, the total capacity of the port is small: the total quay length is 300 m, and the maximum permissible depth is 6.1 m. There is a large marina next to the southern basin with a total capacity of ca. 500 berths.

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Altogether, the municipal marina and two private marinas offer more than 1 500 berths (Figure 37).

Main enterprises in the port area are catering to the needs of the German Navy and focuses on training in rescuing at sea and other naval vocations.

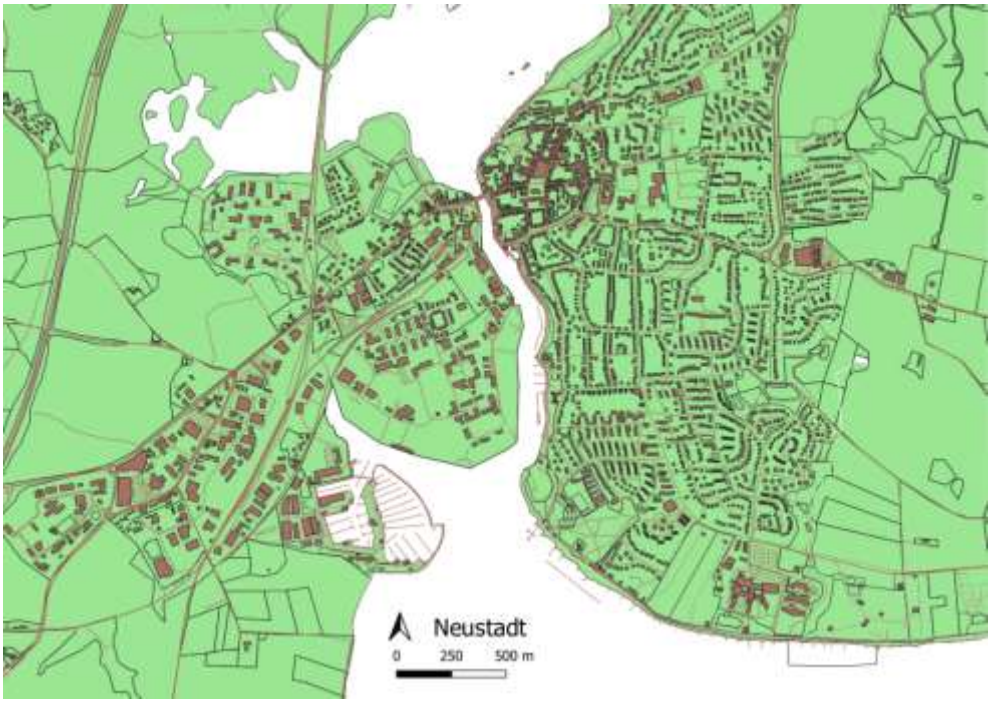

Figure 37. Port area of Neustadt

Source: Based on © OpenStreetMap authors.

3.3.12. Nordenham

Ownership and management. The Nordenham seaport with three harbours in the municipal port of Nordenham and neighbouring Blexen is owned by the federal land of Lower Saxony and operated by the state-owned port operator

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Niedersachsen Ports GmbH & Co. KG Brake branch. The largest port areas are privately operated by Rhenus Midgard GmbH & Co. KG.

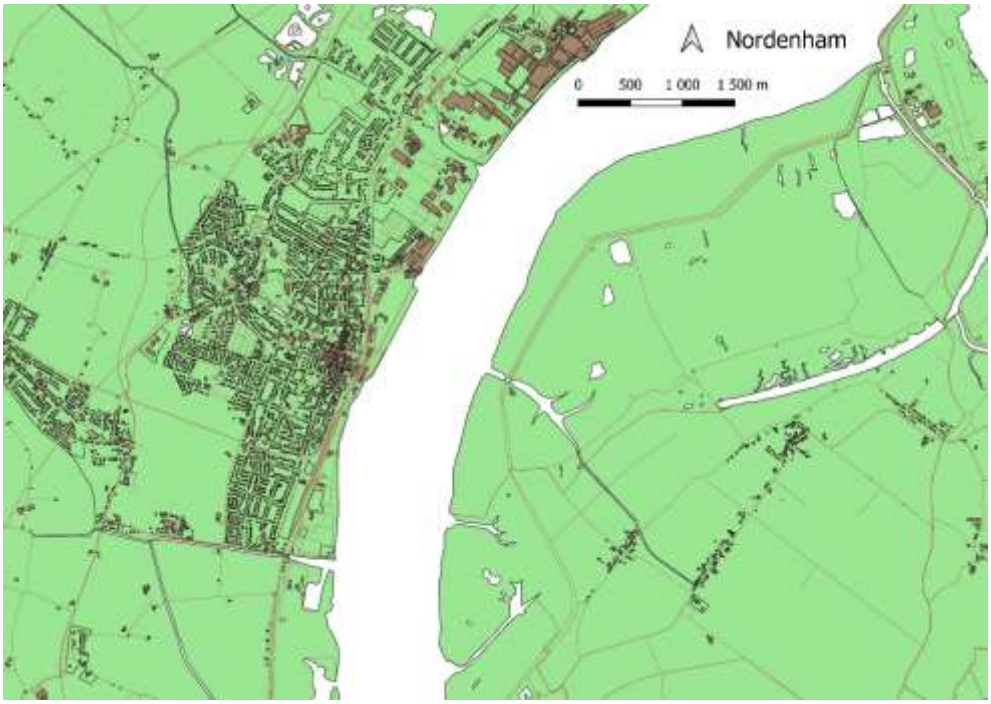

Figure 38. Port area of Nordenham

Source: Based on © OpenStreetMap authors.

Port outline. The Nordenham port is located on the left bank of the lower stream of the Weser River (Unterweser waterway) and comprised of three basins: the lower stream harbour, the upper stream harbour and the Nordenham – Blexen harbour (Figure 38). Port access for sea-going vessels is up to max. 13.10 m draft.

Main enterprises in the port area. The Nordenham seaport has established itself as a service port and as a production location for the airspace and offshore wind energy industries. Many large industrial companies that are based in Nordenham

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also participate in port handling. Premium AEROTEC GmbH plant in Nordenham located next to the port area is a subsidiary of the European airspace giant Airbus and mainly produces fuselage shells for Airbus aircraft. Norddeutsche Seekabelwerke (NSW), Kronos Titan GmbH & Co. OHG, Xstrata Zinc GmbH, Metaleurop Weser Blei GmbH, all produce different products catering to the needs of the North Sea offshore wind energy sector.

Furthermore, Steelwind Nordenham GmbH, a subsidiary of Dillinger Hütte GmbH & Co. KG produces monopiles for offshore wind turbines whereas NKT Cables GmbH (formerly known as Kabelgarnituren Nordenham GmbH) produces cables for the offshore wind farms. The latter company is owned by the industrial group NKT Holding A / S with over 6 000 employees worldwide.

3.3.13. Oldenburg

Ownership and management. Oldenburg Port is owned by the federal land of Lower Saxony and operated by the state-owned port operator Niedersachsen Ports GmbH & Co. KG Oldenburg branch.

Figure 39. Port area of Oldenburg

Source: Based on © OpenStreetMap authors.

Port outline. The port is situated on both banks of the Hunte river, the left-side tributary of Weser. There are four quays with total length of 1 900 m and the maximum permissible depth of 4.5 m (the Eastern quay) to 3 m (the Old City quay) (Figure 39).

Main enterprises in the port area. Several innovative enterprises located in the Oldenburg port area along the river Hunte: Ashampoo GmbH & Co. KG, BASF Coatings GmbH, CEWE Foundation & Co. KGaA, EWE Aktiengesellschaft with its subsidiaries (EWE Vertrieb GmbH, EWE Trading GmbH, EWE TEL GmbH, EWE NETZ GmbH, BTC AG etc.).

HB Hunte Engineering GmbH is one of the most innovative enterprises with over 150 years of expertise in shipbuilding engineering. Currently, its main focus is on

innovative engineering of LNG tankers. The engineering team covers the entire process of LNG tanker design steps – from the determination of main particulars considering given restrictions to load line check, to design study concept considering the operational profile, to construction basics and deadweight check, including all interim steps.

3.3.14. Papenburg

Ownership and management. Papenburg Port is owned by the federal land of Lower Saxony and operated by the state-owned port operator Niedersachsen Ports GmbH & Co. KG Papenburg branch.

Port outline. The port of Papenburg is an estuarine sea and inland waterway hub situated in the Ems River estuary. The harbour basin in the northern industrial area of the Papenburg city has a length of 1 320 m. A concept for the development of the "Bokeler Bogen" industrial and port area provides additional space for the port industry and manufacturing companies. The Meyer Werft shipyard has its basin (to 6 m deep) (Figure 40). The Ems river barrier at Gan-Dersum regulates the water level at the port of Papenburg

Main enterprises in the port area. The Papenburg seaport is increasingly positioning itself in the area of services for the offshore wind energy sector. Papenburg is the seat of the test site of Automotive Testing Papenburg GmbH & Co. KG and many other well-known companies from various industries. Besides, Papenburg is also internationally known for the innovative shipbuilding of the shipyard Meyer Werft GmbH & Co. KG. It is one of the largest and most modern shipyards in the world.

For decades, cruise ships for international cruise shipping companies are built in the vast production and construction docking halls in Pappenburg. To date, around 50 of these luxury liners have left the shipyard – and the next ones are

already under construction. The role of Meyer Werft is so pivotal for the German shipbuilding economy that the Ems river estuary is dammed up once or twice a year with the help of the barrier at Gandersum, so that the ocean-going vessels completed at Meyer Werft could be transferred to the North Sea.

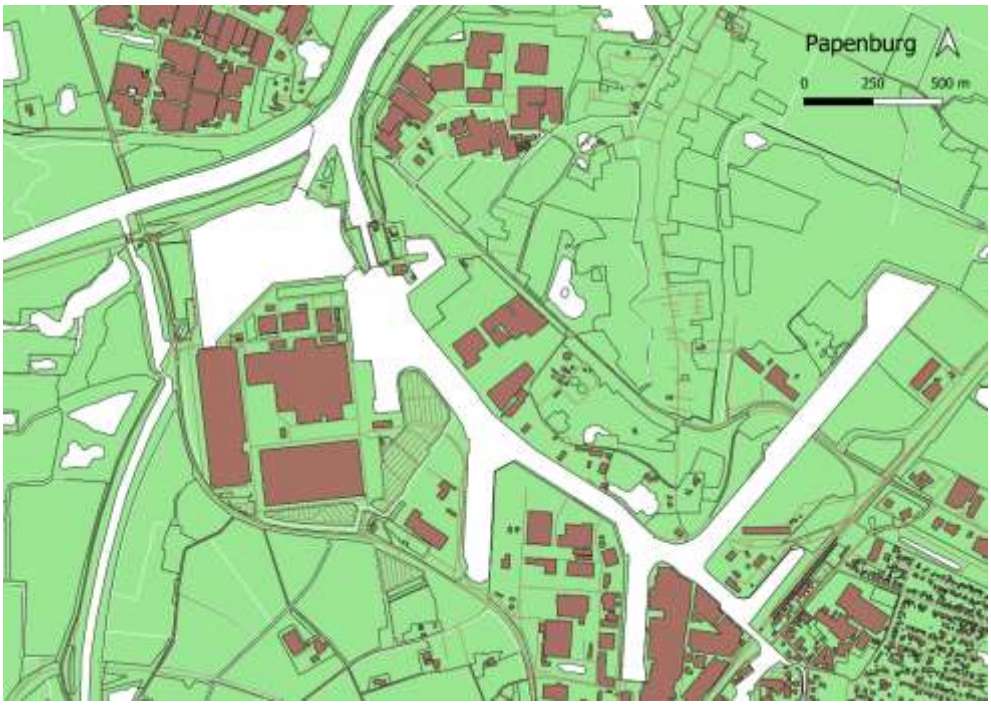

Figure 40. Port area of Papenburg

Source: Based on © OpenStreetMap authors.

3.3.15. Rendsburg

Ownership and management. There are two different ports in the Rendsburg area. Rendsburg County Port (Kreishafen Rendsburg) is owned by Rendsburg – Eckernförde County, operated by the business development agency of the Rendsburg – Eckernförde County and caters to the needs of the region. Meanwhile,

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the port of Rendsburg Osterrönfeld is a new port, which is managed by Rendsburg Port Authority GmbH and operated by Rendsburg Port GmbH, which in turn is a merger of Brunsbüttel Ports GmbH and Ahlmann Zerssen GmbH & Co. KG. The Nobiskrug shipyard also has its quay, which is only used by the shipyard itself.

Port outline. Rendsburg County Port is located on the north bank of the Kiel Canal. It has a 900 m long quay for sea-going vessels as well as the shipyard harbour of Werft Saatsee with a building yard of the WSA Kiel – Holtenau. There are also two port facilities in Obereider, one of which is used only by excursion boats. The other is on the Büdelsdorfer Ufer and is used by the ACO company. The port of Rendsburg Osterrönfeld is located on the south bank of the Kiel Canal (Figure 41). It offers heavy-duty work areas, sufficient fore-storage areas, modern superstructure and ideal location conditions for manufacturers and shippers of particularly heavy goods, including offshore wind turbine components.

Main enterprises in the port area. Nobiskrug GmbH is a shipyard based in Rendsburg on the Kiel Canal. The shipyard is mainly known for the construction of superyachts. Nobiskrug is a shipyard specializing in the construction, renovation and repair of superyachts. The company today develops and builds superyachts from a length of 60 m. Also, Nobiskrug offers maintenance and repair measures as well as conversions of yachts at German and international shipyard locations. In the area of hydraulic steel construction, Nobiskrug also is building and repairing lock gates and systems, bridges, jetties and other structures for the offshore oil and gas industry. Nobiskrug GmbH belongs to Abu Dhabi Mar.

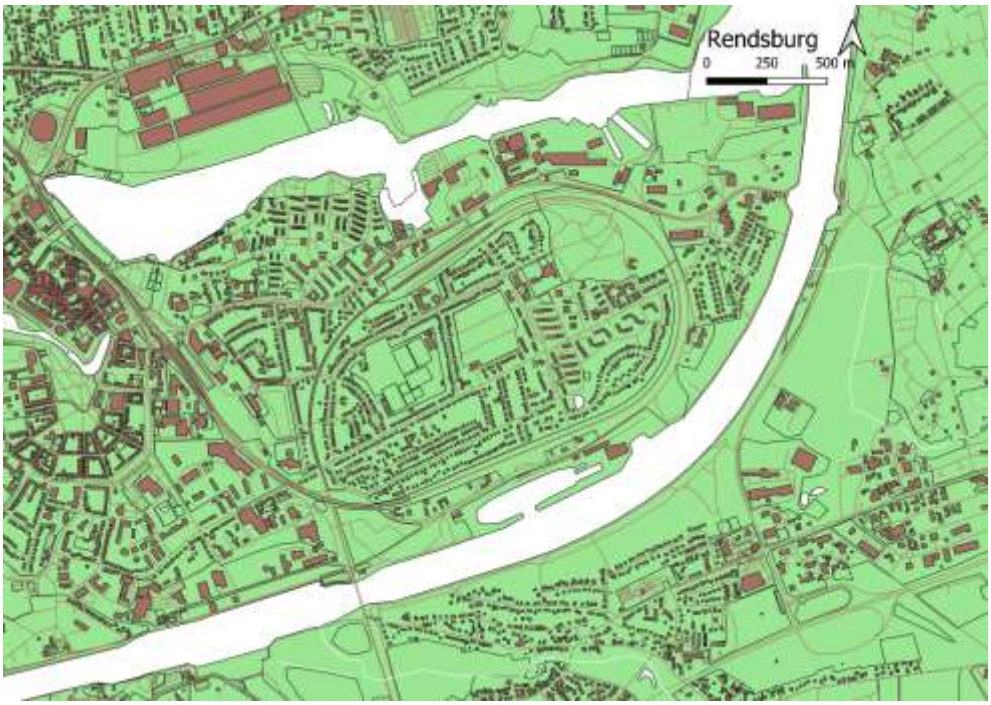

Figure 41. Port area of Rendsburg

Source: Based on © OpenStreetMap authors.

3.3.16. Sassnitz / Mukran

Ownership and management. The ferry port Sassnitz is a German seaport on the Baltic Sea in the district Mukran of Sassnitz Municipality. It is co-owned by Sassnitz Municipality and the federal state of Mecklenburg – Western Pomerania. Fährhafen Sassnitz GmbH is operating the port since May 2016 under the Mukran Port brand.

Port outline. Mukran Port is located on the Prorer Wiek in the east of the island of Rügen. The harbour has a total of 19 berths for ships with a length of up to 365 metres and a draft of 9.5 metres. Three more berths are under construction on the inside of the north jetty as of 2019. In the eastern part of the port, there is a quay

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directly at a fish processing plant. The berth 3a located in the easternmost part of the port was specially designed for loading heavy goods and wind turbines for offshore wind farms so that installation ships can hold cargo here (Figure 42).

Main enterprises in the port area. Relatively good connections to the mainland, fishing traditions, support from the European Union and the German federal government have allowed Sassnitz to remain competitive in the fish processing sector. Rügen fish AG (formerly Rügenfisch GmbH) is headquartered in Mukran Port. The company, which was utterly modernised after German reunification, employs about 200 people and produces a large range of canned fish. The Cuxhaven fish processing plant from Lower Saxony also has a branch in Mukran. The Mukran branch of the Dutch fishing company Parlevliet & Van der Plas processes more than 30 000 tonnes of herring into herring slices, fillets and frozen food every year. A large proportion of herring is supplied by fishermen from Sassnitz and other coastal areas of Mecklenburg – Western Pomerania, who deliver their catches at an agreed price in their boats, rented fish trawlers or trucks to the pier of a modern fish processing centre. The rest is delivered from Schleswig-Holstein, Denmark and Sweden.

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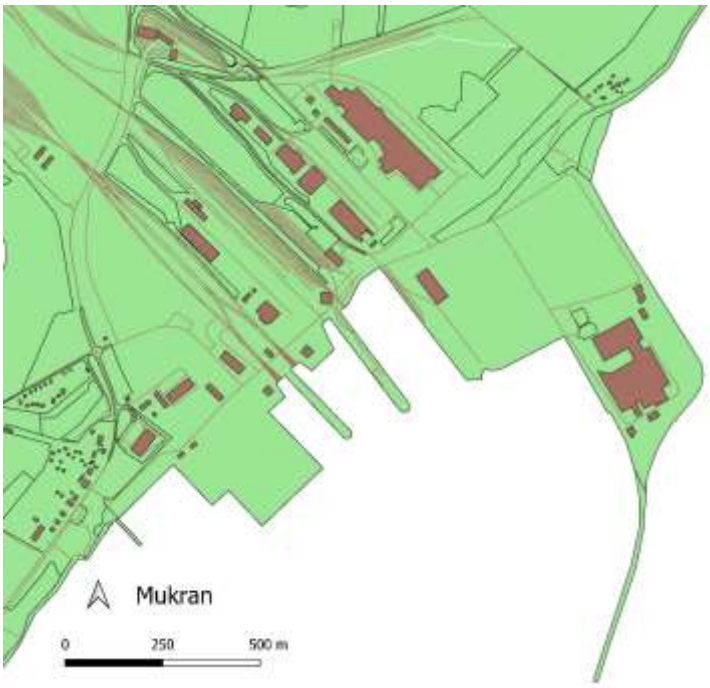

Figure 42. Port area of Mukran

Source: Based on © OpenStreetMap authors.

3.3.17. Stade

Ownership and management. Stade Port is owned by the federal state of Lower Saxony and operated by the state-owned port operator Niedersachsen Ports GmbH & Co. KG branch office Stade-Bützfleth.

Port outline. The Stade-Bützfleth port consists of a north and a south pier, which are used exclusively for the handling of the resident industrial companies, as well as a northwest quay which is also used for leisure boats (Figure 43).

Main enterprises in the port area. Cheminova is a Danish pesticide manufacturer based in Aarhus, which was sold in 2014 by the parent company Auriga Industries

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to the US FMC Corporation. The Stähler Agrochemie GmbH company from Stade was taken over by Cheminova in 2008. The subsidiary has been operating under the name Cheminova Deutschland since 2013. The products produced in the factory located in the Stade-Bützfleth port area include various pesticides for sale, mainly in Europe and Latin America.

Figure 43. Port area of Stade

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3.3.18. Stralsund

Ownership and management. Stralsund Port is owned by Stralsund Municipality, and its operator is Seehafen Stralsund GmbH, a subsidiary enterprise of Stadtwerke Stralsund SWS, a municipal transportation company.

Port outline. Stralsund seaport consists of North Harbour, South Harbour and Frankenhafen Harbour. Besides these three commercial port basins, there are several marinas for leisure boats and a river cruise pier (Figure 44).

Main enterprises in the port area. The MV Werften Stralsund GmbH (1948–2010: Volkswerft Stralsund, 2010–2014: P + S Werften, 2015–2016: Nordic Yards Stralsund) is a shipyard currently owned by Genting Group. Design contracts for luxury cruise ships of the Endeavor class with the ice-class PC6 have been signed, and the construction of the first seven ships began in late 2017. These ships have to be completed in 2020. The order is worth 1.5 Bio. Euros. Besides, in Stralsund hull segments for the cruise ships built in Rostock and Wismar are to be supplied.

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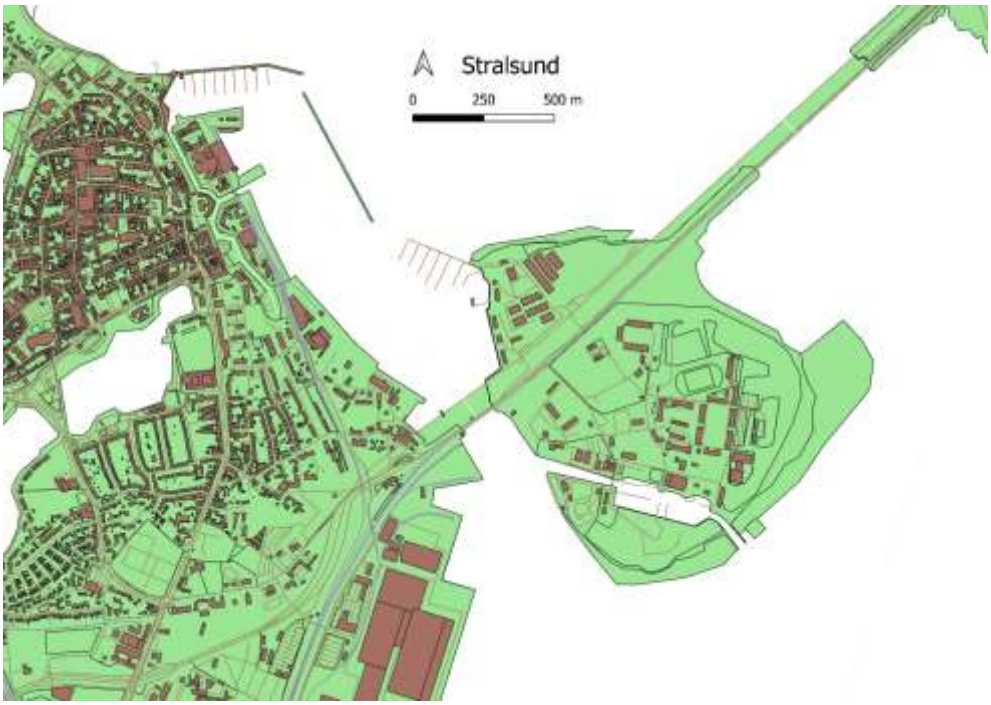

Figure 44. Port area of Stralsund

Source: fish Based on © OpenStreetMap authors.

3.3.19. Uetersen

Ownership and management. Port Uetersen is owned by Uetersen Municipality and operated by a municipal enterprise.

Port outline. The port of Uetersen is currently almost defunct due to siltation and the maximum permissible draft of 2 m (Figure 45).

Main enterprises in the port area. The port area in Uetersen is a perfect example of the port how the port area may be attractive as a hub for various innovative industries. Despite the port of Uetersen being almost defunct regarding navigation due to siltation, the port area hosts a pharmaceutical company Nordmark specializing in gastrointestinal drugs and producing active ingredients collagenase

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and pancreatin. Uetersen is an industrial and business location with over 1 000 companies. One of the other largest companies in the Uetersen port area is the Feldmuehle company which specializes in the production of photo printing paper and wet-strength label paper.

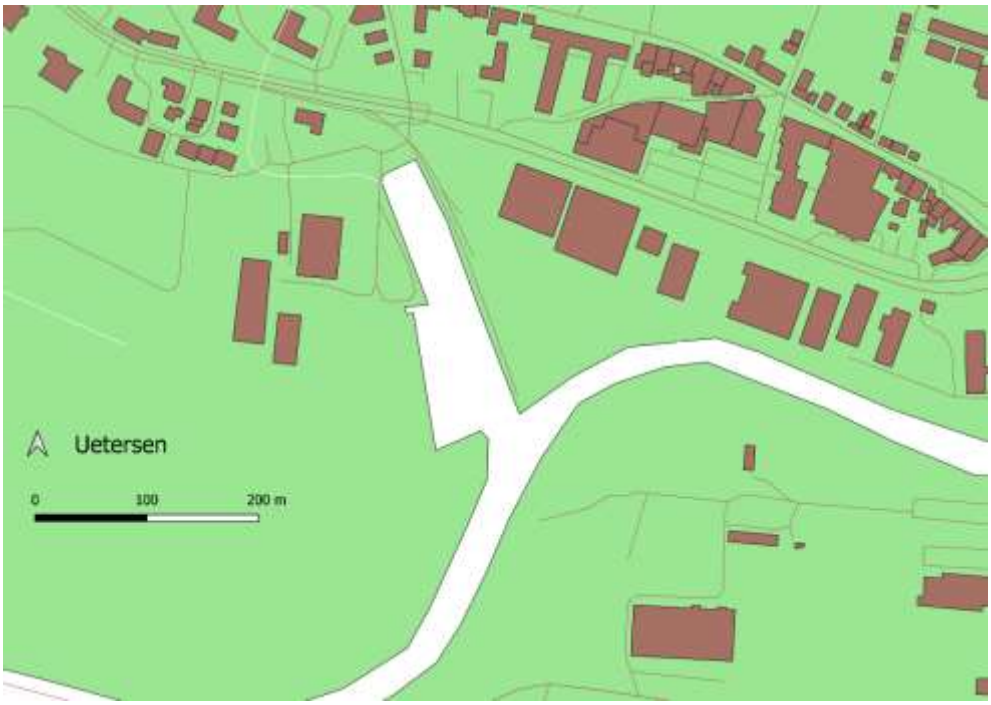

Figure 45. Port area of Uetersen

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3.4. Poland

3.4.1. Darłowo

Ownership and management. Darłowo Port is a Polish seaport which is owned by the municipality of Darłowo, managed by the municipal Seaport Darłowo Administration and operated by Morska Agencja Gdynia Ltd. as well as several other private operators.

Figure 46. Port area of Darłowo

Source: Based on © OpenStreetMap authors.

Port outline. Darłowo Port is an open port on the mainland Polish coast of the

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Baltic Sea. It is a commercial and fishing port, located in the mouth of the Wieprza River. The port covers a ca. 3-km section of the Wieprza estuary coast. It lies about 25 NM west of the Ustka port and 33 NM east of the Kołobrzeg port. Darłowo Port consists of two basins; the first one is located near the Baltic Sea, with breakwaters, port entrance, the fore-port, the fishing harbour with a bridge. The second basin of the port is located about 2.3 km from the port entrance near the city of Darłowo with the ship turning basin, the Industrial basin and the Wieprza river estuary (Figure 46).

Main enterprises in the port area. Recreational fisheries (sea angling) is becoming a more critical source of income than commercial fisheries for Darłowo, which is turning into a Polish ‘capital of recreational cod fishing‘.

3.4.2. Hel

Ownership and management. Since the 1st of July 2007, the port has been managed by a State Treasury company – the Hel Koga Sea Port Board was established as a result of the commercialization of a state enterprise under the name "Przedsiębiorstwo Usług Portowych" KOGA "in Hel". Part of the processing facilities in the central part of the port is owned by the fish processing company "Koga – Maris". The centre of the port also has a Fish Sale Centre, and the refrigeration activity is carried out by Hel Fridges. Within the administrative boundaries of the port, there is also the area used by the municipality. Most of the port areas outside the coastal protection belt have been privatized. Investments related to tourist service and housing are currently planned in areas that were previously used for storing or processing fish.

Port outline. During the renovation, a new pier was built separating the marina from the outdoor pool and a berth for passenger ships (water trams). After the renovation, the harbour area was divided by piers into three basins: Outer basin, Inner basin and Yacht basin (Figure 47).

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Main enterprises in the port area. The original fishing port with the possibility of servicing small commercial vessels has significantly reduced its fishing activity in recent years and transformed into a seasonal passenger port. Currently, the entire port of Hel is dedicated to leisure purposes. Besides the marina and the water tram pier, there are three enterprises offering diving services.

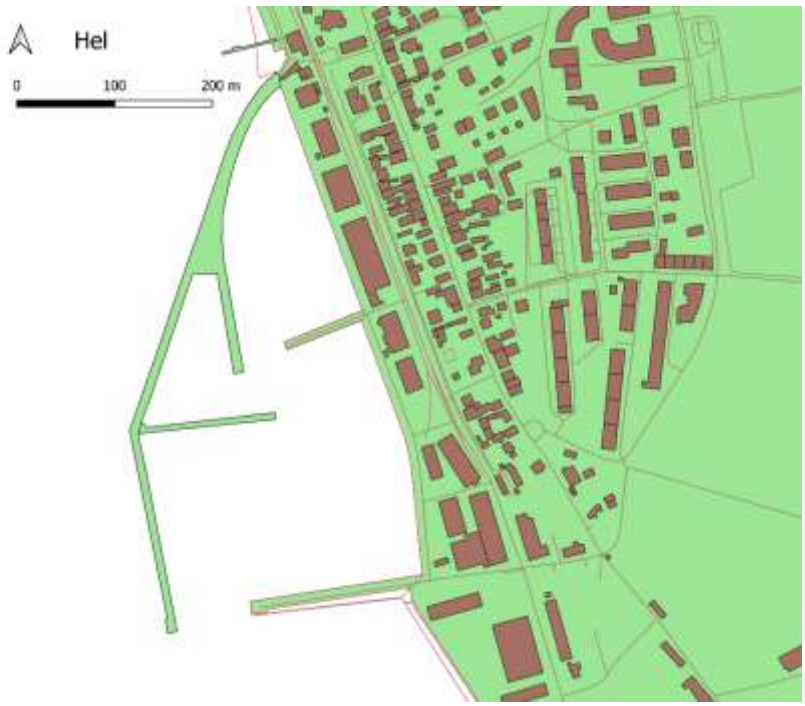

Figure 47. Port area of Hel

Source: Based on © OpenStreetMap authors.

3.4.3. Kołobrzeg

Ownership and management. Kołobrzeg Port is a Polish seaport which is owned by the municipality of Kołobrzeg, managed by the municipal Seaport Kołobrzeg Administration as well as several private operators.

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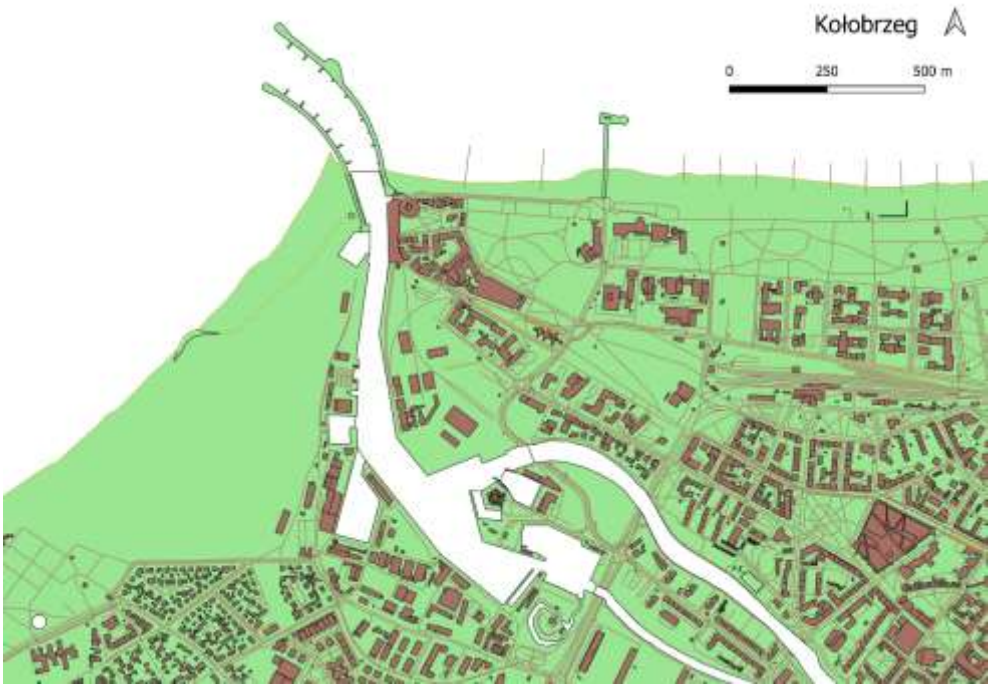

Figure 48. Port area of Kołobrzeg

Source: Based on © OpenStreetMap authors.

Port outline. The five port basins are situated on both banks of the Parsęta River: on the right, there is a passenger marina including the Passenger Quay and the Pilot Quay as well as the Commercial Port (Figure 48), where transhipment takes place at the Coal, Grain, Słupsk and Koszalin quays. The marina includes the following quays and basins: Boatbuilding, Pier, Tourist, Yacht, Maneuvering, School, Sailing and Boat Basin. It is located on Salt Island. On the left bank of the Parsęta River, there is a fishing port and a naval base.

Main enterprises in the port area. Over 200 entrepreneurs from various branches of the economy operate within the area of the port. Two shipyards – Kołobrzeska Stocznia Remontowa DOK and Parsęta Shipyard – offer services in ship repair and construction. Both shipyards share the same territory of the Kołobrzeg port, which

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before the changes of the late 1980s, was used by the state naval shipyard with long traditions of naval shipbuilding.

Kołobrzeska Stocznia Remontowa DOK (DOK Shipyard) is a company currently privately-owned by an individual owner with many years of experience in repairing vessels and combining tradition that gives a sense of security and modernity. Its activity focuses on ship repairs in a wide range of services. During the year DOK Shipyard accepts about 80 vessels for the repair work, mainly the Polish ones. However, in recent years more and more customers from Denmark, Sweden and Germany have been coming as customers to the shipyard. Kołobrzeska Stocznia Remontowa DOK (DOK Shipyard) works with Hempel Paints and Sigma Coatings, global paint manufacturers for ship constructions.

Stocznia Parsęta s.c. earlier was called Morski Serwis Technicznych i Specjalnych s.c. The services offered at the shipyard include a wide range of ship repair processes for which there are many profiled entities, including the engine workshop, the workshops of hydraulics and ship electric, as well as the design office. The plant provides a wide range of turning, locksmith and welding services. However, it mainly renovates vessels and builds new ones under the supervision of the Polish Register of Shipping. The shipyard has its wharf (including a hall on which it is possible to build floating facilities). Numerous local and Scandinavian shipowners use the services of 'Parsęta'.

3.4.4. Police

Ownership and management. The Police seaport is the fourth busiest one in Poland with the fertilizers and petro-chemicals as its commercial profile. The state-controlled Grupa Azoty, a major Polish producer of nitrogen fertilizers, uses the Police port for product export and raw material import purposes. A 90% stake in the seaport owner and operator, Port Morski Police, is owned by Grupa Azoty Police S/A, the local subsidiary of Grupa Azoty S/A.

Port outline. The Police seaport consists of a single basin on the West Odra estuarine branch of the Odra River (Figure 49). The port has one 420 m long quay dedicated solely to export purposes of nitrogen fertilizers produced at Grupa Azoty Police S/A.

Main enterprises in the port area. There are no significant enterprises in the Police port area.

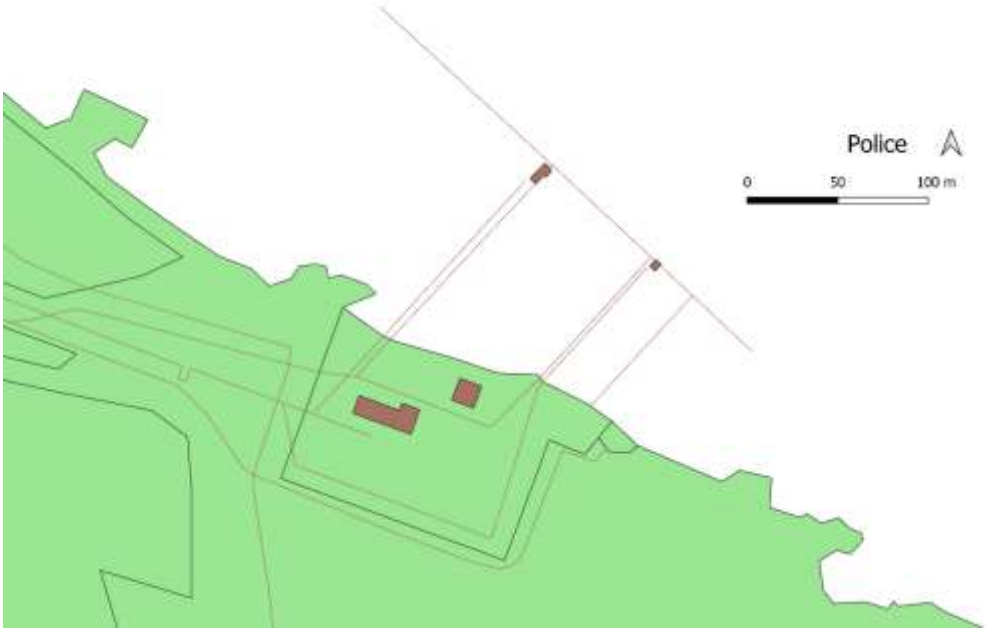

Figure 49. Port area of Police

Source: Based on © OpenStreetMap authors.

3.4.5. Ustka

Ownership and management. Differently from the majority of other South Baltic ports, the ownership and management of the seaport of Ustka is rather patchy. Ca. 42% of the port area is owned by the Maritime Office. Euro-Industry Ltd. is

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another significant owner or operator on 21% of the total land surface of the port. It owns the excess port areas of the former Ustka Shipyard as well as is a managing agent on the area of the former silo (owned by El-Port Ltd.) The Korab SA company specialised in storing and transhipment of pulp and paper products has a perpetual lease of land covering another 19% of the port area.

Port outline. The port is located at the mouth of the Słupia River. The entrance to the outer port from the sea is protected by two concrete breakwaters ca. 320 m long, which constitute the mouth of the Słupia River forming the Outer port. The Inner port stretches along this river for about 1 100 m, to a railway bridge, which limits its further extension. There are 4 basins in the Inner port (Figure 50). From the south, the Inner port is closed by two bridges (rail and road), which pass over the Osadowy Basin. On the eastern shore of Słupia, there is a Winter Basin equipped with a slip for units up to 24 m long. On the west bank of the river, there is a short Construction and Coal Basin, which is separated from the river by Darłowo, Łeba and Elbląg quays. The total length of the quays is over 3 400 m, of which 586 m are still operational. Passenger ships moor at the Kołobrzeg quay, border checks take place at the Pilot quay (the base of the Eastern Breakwater). Tourist and leisure boats can moor in the marina of the Coal Basin.

Main enterprises in the port area. In terms of the number of registered fishing boats, Ustka remains the largest fishing port in Poland. However, most of the boats are relatively small ones owned by private owners. Stocznia Ustka Ltd. is a local shipyard which produces small vessels for various purposes, e.g. life-, patrol- and workboats, as well as leisure boats and provides their maintenance. It also manufactures life-saving service appliances, workboats and marine communication devices. Stocznia Ustka Ltd. also sells spare parts and equipment for lifeboats and rescue equipment.

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Figure 50. Port area of Ustka

Source: Based on © OpenStreetMap authors.

3.4.6. Władysławowo

Ownership and management. The major part of Władysławowo Port is owned by the Puck County. The port is managed by "Szkuner" Ltd., a public company of fisheries and fishery services with headquarters in Władysławowo. It performs the operational functions of the port.

Port outline. Władysławowo Port consists of two basins – an Outer basin and a larger sheltered Inner basin (Figure 51). The port was built as a fishing port and is mainly adapted to serve cutters. It has storage yards, a railway siding and a mobile crane with a capacity of 18 tonnes. It enables using of diving and towing services.

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Main enterprises in the port area. "Szkuner" Ltd. is a public company of fisheries and fishery services with headquarters in Władysławowo which provides shipbuilding services including the repair of cutters and smaller ships. "Szkuner" Ltd. offers comprehensive repair services of rollers and axles made of weldable materials. The shipyard also provides services of regeneration of bottom valves, repair works of agricultural machinery, equipment of trawl lifts, anchors, etc.

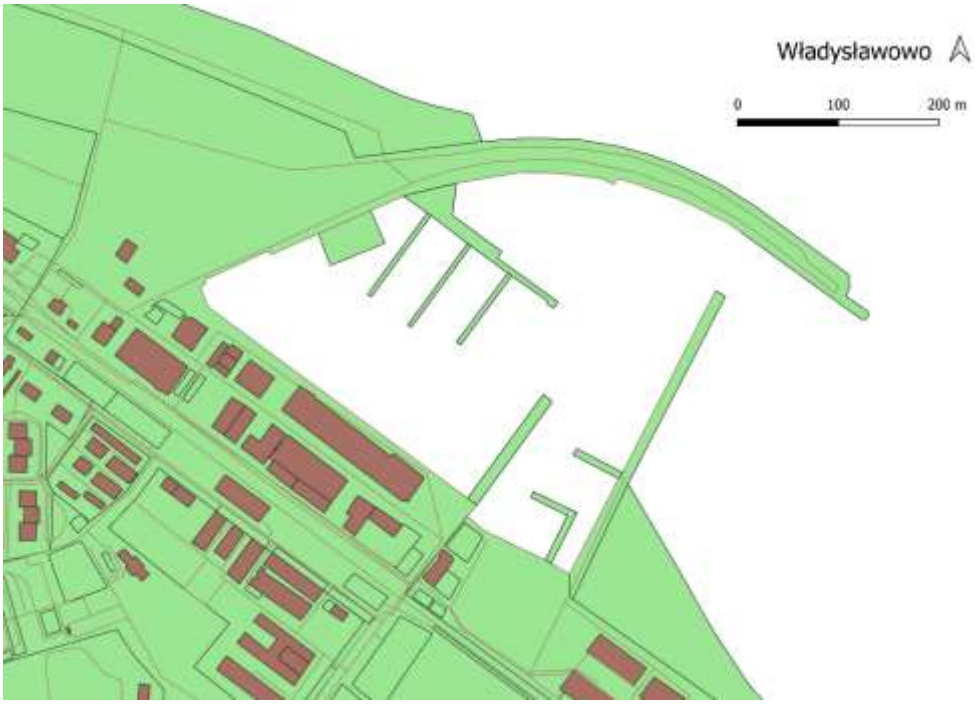

Figure 51. Port area of Władysławowo

Source: Based on © OpenStreetMap authors.

3.4.7. Stepnica

Ownership and management. The Stepnica port is managed by the Wiktoria Port Ltd.

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Port outline. There are two transshipment quays (167 m and 146 m long) and one quay adapted for ro-ro transhipments in the Stepnica port. The entrance to the basin is formed by two breakwaters of 13.96 m each. Their construction consists of two steel sheet piling, filled with sand. The width of the entrance is 19.0 m. In the port area there are also office, social and storage rooms. The port's offer can certainly be attractive thanks to the convenient location which can be an alternative to even the port of Szczecin or Świnoujście and the fact that a newly built access road leads directly to the port. It is also possible to load both inland barges and sea vessels in the port.

Main enterprises in the port area. Wiktoria Port Ltd. is a company specializing in the transhipment of grain and seeds at the premises of the Transhipment Port in Stepnica. The company has a storage yard with an area of 14 000 m^2 and a ro-ro station. In March 2015, after obtaining all permits, an investment was started consisting in building a grain elevator with a capacity of 12 000 tonnes.

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Figure 52. Port area of Stepnica

Source: Based on © OpenStreetMap authors.

3.5. Sweden

3.5.1. Falkenberg

Ownership and management. The port facilities are owned by the municipal company Fal-Kenbergs Hamn AB, which rents them out to the privately owned Falkenbergs Terminal AB.

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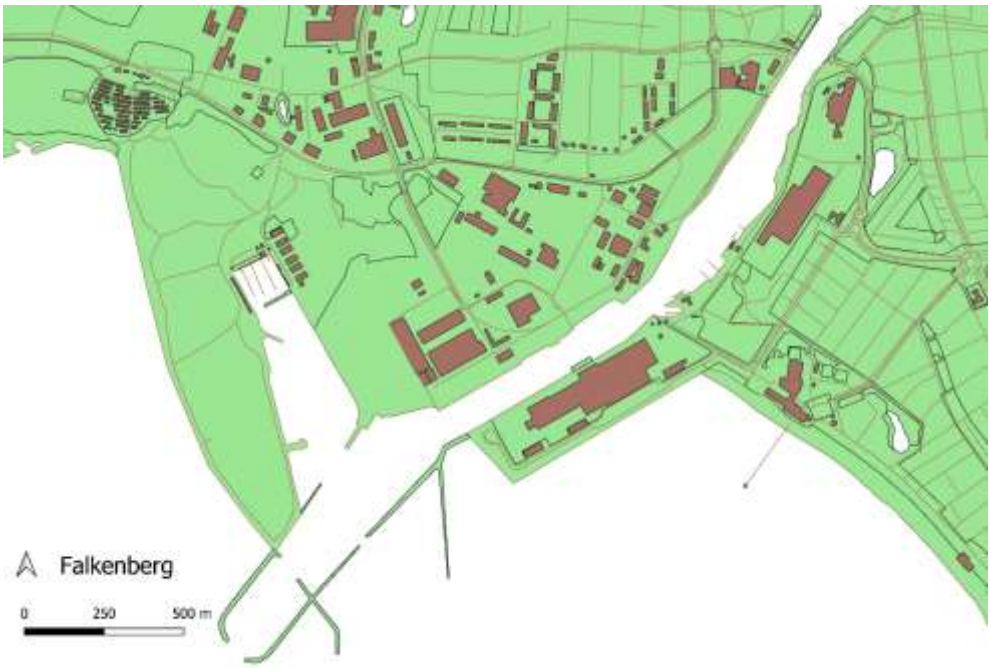

Figure 53. Port area of Falkenberg

Source: Based on © OpenStreetMap authors.

Port outline. Falkenberg Port starts at the Ätrans estuary in the sea and extends upstream to the Southern bridge. Falkenberg's yards, marina. The port of Falkenberg has a short and safe fairway with a depth of seven metres. The main basin with the ca. 3 000 m length of quays is in the estuary while the marina in Lövstaviken has its basin (Figure 53).

Main enterprises in the port area. Falkvarv AB is a modern shipyard, situated on the Swedish west coast between the strait of Öresund and Gothenburg it is characterised by high technical expertise and solid long-term experience. The relatively moderate size of the shipyard with approximately 50 employees makes it possible to take fast decisions. Falkvarv AB can undertake practically all shipyard

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work, including technically complicated extensive engine rebuilding. Falkvarv AB can drydock ships up to a length of 150 metres.

3.5.2. Kalmar

Ownership and management. Kalmar Port is owned by Kalmar Municipality and operated by Kalmar Hamn AB, which is owned by the municipal service company Kalmar Kommun-Bolag AB. The marinas in the port area and around are operated by Kalmar Marina AB.

Port outline. Kalmar Port consists of four basins: Outer (Oil) basin, as well as two inner basins – Old and New – as well as a marina basin for leisure boats (Figure 54).

Main enterprises in the port area. Kalmar Port is the main site of the Linnæus University campus with the School of Economics, Institute for Culture Research and the Fojo Media Institute located there.

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Figure 54. Port area of Kalmar

Source: Based on © OpenStreetMap authors.

3.5.3. Landskrona

Ownership and management. Landskrona Port is owned by Landskrona Municipality and operated by Landskrona Hamn AB, which, in its turn is owned by the municipality as well. The marina of Landskrona is owned and operated by Landskrona Marina AB.

Port outline. The commercial harbour of Landskrona comprises three basins: Outer basin, Inner basin and Southern basin. Altogether, there are five quays with a depth of 6 to 7.2 m for transhipment of goods, mainly bulk cargo: Skeppsbro quay (347 m), Phosphate quay (454 m), Inner Southern quay (110 m), Bruuns quay (82 m), Outer Southern quay (460 m). Three mobile folding arm cranes operate along

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the 1 100 m length of the quays. There is also a belt conveyor for dust-free unloading to silos and ship unloaders (Figure 55).

Main enterprises in the port area. Oresund Heavy Industries AB is the parent company of the subsidiary companies Oresund Dry Docks AB and Oresund Steel Construction AB. The group operates within the fields of ship repairs and reconstruction (through its subsidiary Oresund Dry Docks) and the manufacturing of large, complex steel structures (through its subsidiary Oresund Steel Construction). During recent years, the group has experienced impressive growth. It is mainly due to the substantial investments the group has made in order to meet the increasing demand for ship repair services. Oresund Heavy Industries offers leading competencies within each area of operation, a continual increase in capacities and ideal location – strategically situated in the port area of Landskrona – on the edge of the Oresund, one of the world's busiest shipping routes.

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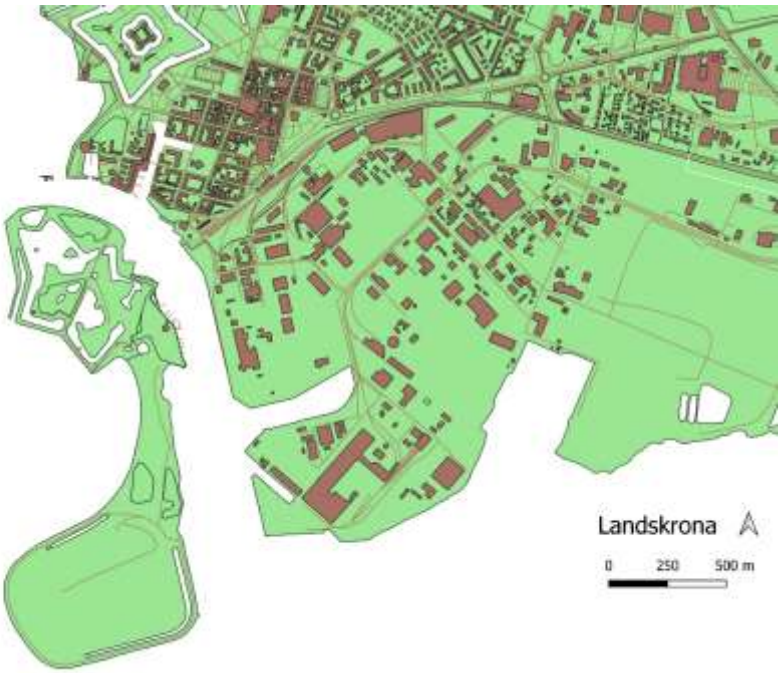

Figure 55. Port area of Landskrona

Source: Based on © OpenStreetMap authors.

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3.5.4. Lysekil

Figure 56. Port basins of Lysekil

Source: Based on © OpenStreetMap authors.

Ownership and management. Lysekil Port is owned by Lysekil Municipality and operated by Lysekils Hamn AB, which, in its turn is owned by the municipality as well. Also, the inner marina is owned by the municipality.

Port outline. Lysekil Port consists of the Outer basin, the Southern basin and the Inner basin (Figure 56). There are three quays around the Southern and the Inner basin: Anderssson quay (180 m length, 5,5 m depth), Gullmar quay (180 m length, 9 m depth), and Grötö quay (160 m length, 7 m depth). There are two privately owned marinas outside the harbour area.

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Main enterprises in the port area. Nicander's Boatyard / MTN Marin was founded in 1987 by the brothers Mikael and Thomas Nicander in Lysekil. In 2009, the two companies merged and are now only called Nicanders Båtvarv AB. The company produces and sells the new type of a MF boat, which was designed by Sture Sundén, Nicander 40′ designed by Anders Ericson and CB365 designed by Carl Beyer. These boats are a modern luxury and racing yachts that combine incredible sailing properties with pleasure. The company also leases an area in the Southern basin (South Port of Lysekil) where it also has premises for winter laying of boats.

G&M Envases Universales Sweden AB is a yet another enterprise in the Lysekil port area. It caters to any possible diverse needs of their clients in canning and other metal works. G&M Lysekil AB is a subsidiary of G&M A / S in Denmark, a group with three production units in Denmark which specializes in high-quality and innovative metal packaging solutions for the food, beverage and media industry.

3.5.5. Simrishamn

Ownership and management. Simrishamn Port is fully owned and operated by Simrishamn Municipality.

Port outline. Simrishamn Port consists of four basins: the outer basin, the inner basin, the fishing and commercial vessel basin as well as the leisure boat basin (Figure 57). The fishing and commercial vessel basin have two terminals with large flat surfaces. There are mobile cranes, excavators, and large surfaces suitable for bulk cargo loading. The leisure boat basin is adjacent to the other three basins and has six piers with 380 berths.

Main enterprises in the port area. Skillinge Fisk-Impex AB is one of the largest fishing companies in Sweden. Most of the company's fish are fished along the

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eastern coast by local fishermen. Skillinge Fisk-Impex AB receives, unloads, sorts, fillets and packs the catch in the Simrishamn's fishing port. Most of the catch is sold on the Swedish fresh fish market.

In order not to waste any part of the catch, the company also has a freezer house with the capacity to freeze 200 tonnes of fish per day sold to the pet food industry, but much of the frozen fish is also exported. Skillnge Fisk-Impex AB also owns and operates Ekströms Fisk & Restaurang, and Skillinge Rökeri smoked fish shop. Both fish shops have the largest range of fish products from their smokehouse smoked in an old-fashioned way over an open fire, without flavour enhancers or smoke aromas. In collaboration with Skillinge Fisk-Impex AB, Simrishamn Port also offers ice production facilities for any purposes and needs of the clients – from keeping the catch fresh to providing ice cubes for cocktail parties.

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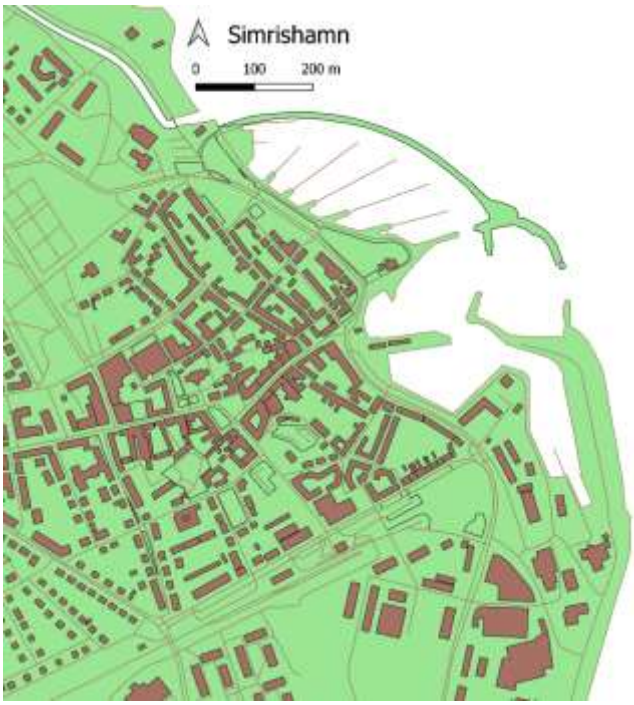

Figure 57. Port basins of Simrishamn

Source: Based on © OpenStreetMap authors.

3.5.6. Sölvesborg

Ownership and management. Sölvesborg Port is a municipal port which is operated by Sölvesborgs Stuveri & Hamn AB. It is a stock company with mixed ownership where the shares are distributed in the following way: Sölvesborg Shipping AB owns 42.1% of shares, Sölvesborg Municipality – 37.1%, minor shareholders – 20.8% of shares.

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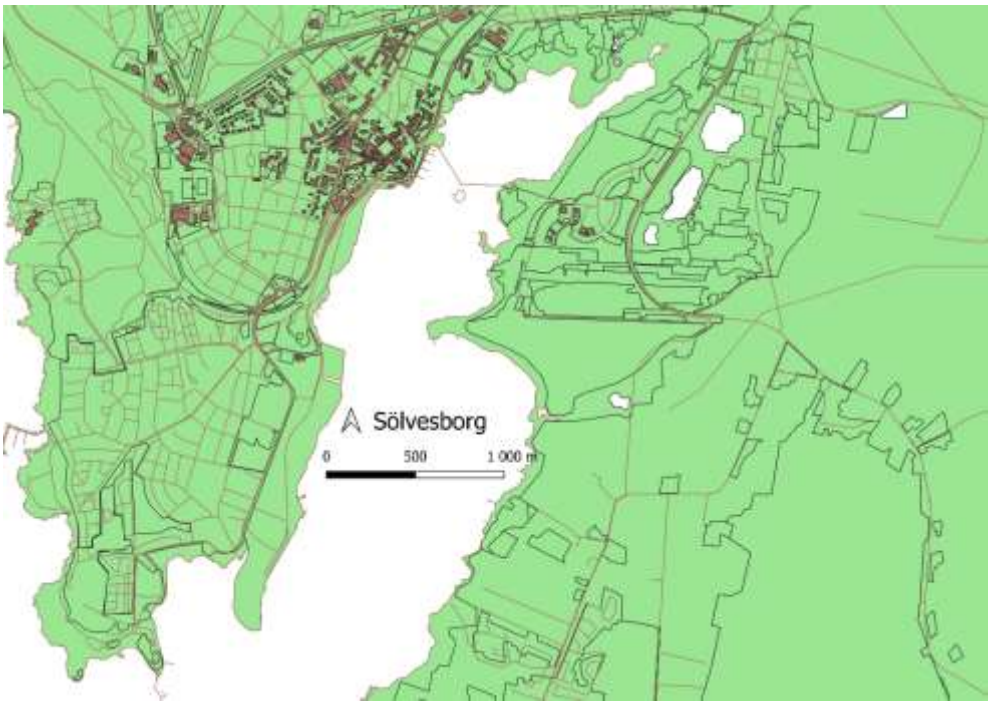

Figure 58. Port area of Sölvesborg

Source: Based on © OpenStreetMap authors.

Port outline. Sölvesborg Port consists of two basins: Outer Harbour and Inner Harbour with 850 m of the total length of quays. The marina is located in the town centre (Figure 58).

Main enterprises in the port area. Teko-Tryck i Sölvesborg AB produces and delivers unique screen-printed Swedish sponge cloths and towels of the highest quality to designers, companies, chain stores and distributors worldwide. Teko Tryck introduced the screen-printed Swedish sponge cloth on the market 1994. Most design and promotion cloths on the world market are printed in the Sölvesborg port area and delivered to Germany, France, USA, UK, Japan, South Korea and Australia. Since 1985, the company has also produced screen-printed

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bath towels, runners and other larger formats, yet, this production is currently being phased out due to declining demand.

3.5.7. Uddevalla

Ownership and management. Uddevalla Port is a seaport owned by Uddevalla Municipality. It is operated by Uddevalla Hamnterminal which is a wholly-owned subsidiary of Uddevalla Utvecklings AB and included in Uddevalla Municipal Group.

Port outline. Uddevalla Port consists of two basins: Outer Harbour and Inner Harbour with the 6 km total length of quays in both basins. The Outer Harbour is divided among several sub-basins with their operators and transhipment companies. The marina is located outside the harbour area, next to the beach promenade (Figure 59).

Main enterprises in the port area. Scanfast Scandinavian Fastening AB is a nationwide family company with the main enterprise in the Uddevalla port area. It specializes in manufacturing and sale of compressed air powered tools such as nail guns, electric-powered tools such as sewing machines and associated attachments such as sewing thread, loose screw and roller-banded nail.

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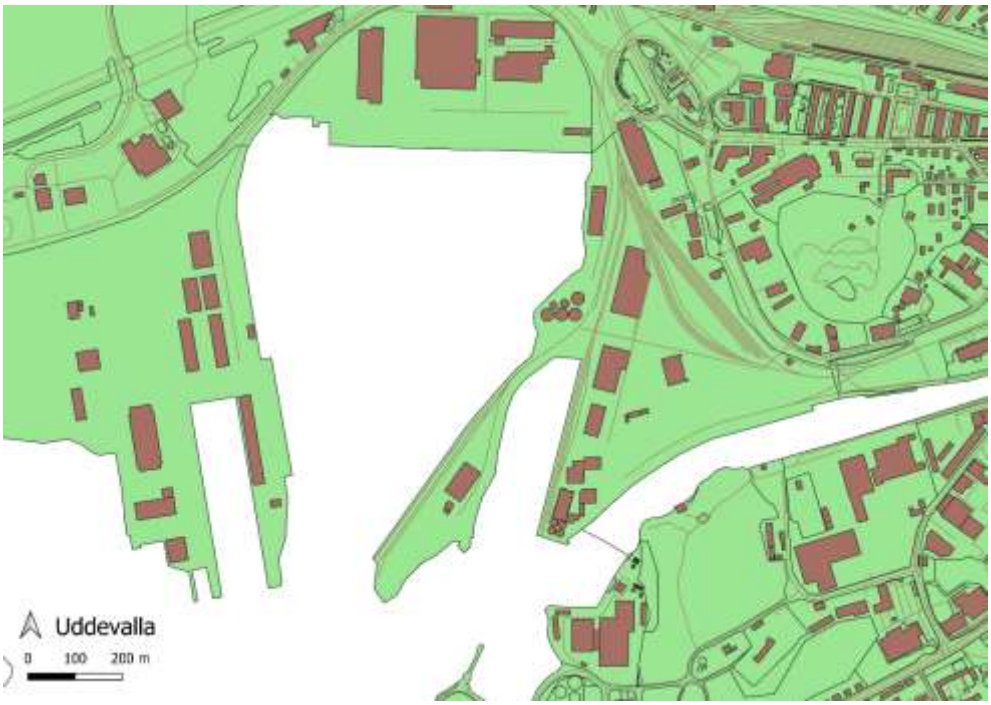

Figure 59. Port area of Uddevala

Source: Based on © OpenStreetMap authors.

3.5.8. Varberg

Ownership and management. Varberg Port is owned by Varberg Municipality and managed by Hallands Hamnar AB, which is the major port operator established as a private-public partnership managing Halmstad Port and Varberg Port – two major seaports in Halland County.

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Figure 60. Port area of Varberg

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Port outline. Varberg Port has three basins – Outer Harbour, Farehamnen Harbour and Inner Harbour. Farehamnen is a new deep harbour. It has a 430-m quay with a depth of 11 m and can receive vessels of 240 metres length. Another 1 000 m quay has 5.2 to 8 m depth (Figure 60). Tugboats and pilots are offered to visiting vessels around the clock. The machinery park contains 10 cranes as well as 35 forklifts and other machines. For visiting leisure boats there is space and service in the Inner harbour, but Varberg's main marina is located at Klöven on Getterön, about 2 km from Varberg harbour.

Main enterprises in the port area. Archemi AB is the manufacturing and sale of chemicals which are primarily used for flue gas purification and water treatment. The company whose manufacturing unit is based next to the Varberg port area has

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also developed several different speciality chemicals for various purposes. Such an advantageous position provides the essential prerequisites for rational management of raw materials.

3.5.9. Åhus

Ownership and management. The port of Åhus is a seaport of Kristianstad Municipality. It is operated by Åhus Stuveri & Hamn AB which is a public-private partnership stock company with mixed ownership.

Port outline. The port of Åhus has two basins – Outer Harbour and Inner Harbour (Figure 61). The total length of quays is 1 595 and the maximum draught is 7.6 m. 1 000 m of the quays are in the bulk terminal equipped with 3 cable cranes on rails with maximum lifting capacity of 25 tonnes.

Main enterprises in the port area. There are no significant enterprises in the Åhus port area, except for warehouses and silos. The harbour area is the seat of operations for companies including The Absolut Company, the Swedish Farmers' Supply and Crop Marketing Association, Knauf Danogips GmbH, Svenska Foder AB, Yara AB, Akzo Nobel Chemicals AB and KLF.[13]

[13] The Port of Åhus today – Åhus Hamn & Stuveri AB. http://www.ahushamn.se/en/the-port-of-ahus-today/

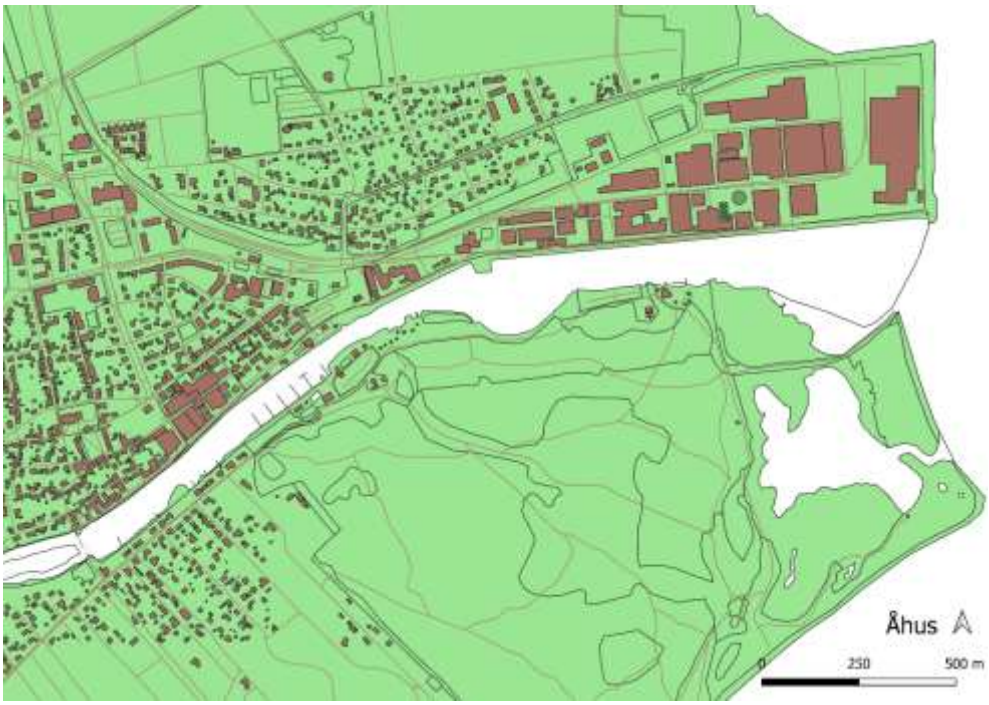

Figure 61. Wider port area of Åhus

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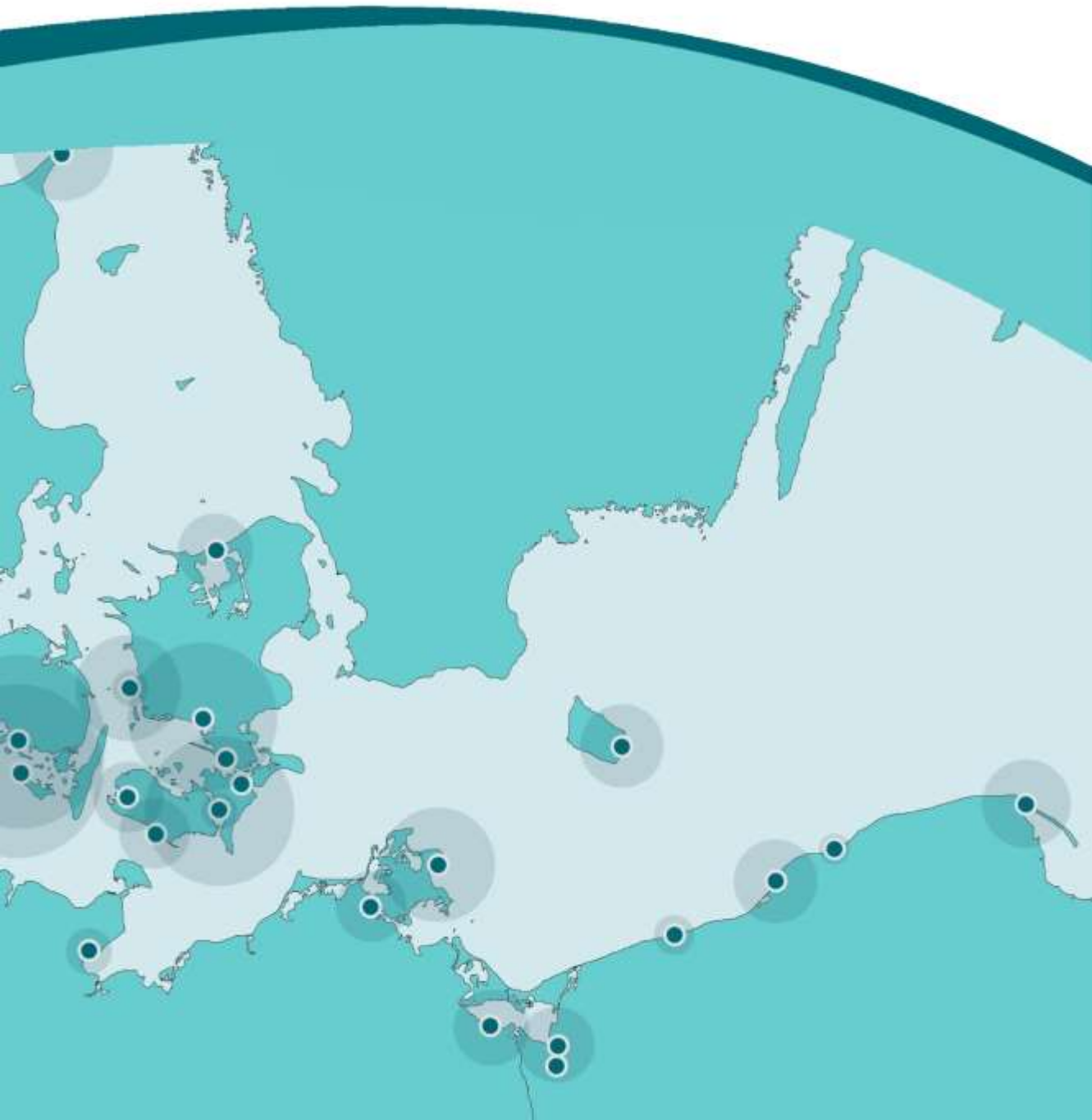
4

Analysis of local seaports along IWW E 60 as development centres



4. ANALYSIS OF LOCAL SEAPORTS ALONG IWW E 60 AS DEVELOPMENT CENTRES

4.1. Development of existing potential and local port functions

The conditions and perspectives for the development of small ports are strictly dependent on such factors as the level, pace and directions of economic and social development of the country and region, the development of local and regional transport infrastructure, as well as the European Union's policy on the maritime sector. Financial resources obtained by some coastal cities and local ports create an opportunity to increase their competitiveness and even change the existing functions of small ports. Actions to increase the attractiveness and use of the economic potential of maritime cities and municipalities are particularly important because of the persistently high unemployment rate in coastal areas compared to other regions of the analysed countries. It is particularly high among people under 25 years of age. The situation is exacerbated by the low rate of job creation, especially outside of large urban centres.

In principle, the most important development opportunity for local ports and coastal regions is a favourable location along with the coast and natural values, as well as their considerable investment and tourist attractiveness. The membership in the European Union can also enable the achievement of benefits from interregional and international cooperation. It is also connected with the EU being an additional source of financing development initiatives as well. The main threat to local ports and maritime economy may be a downturn in the country and in the region, and a shortage of investments that could generate jobs, which in turn causes an outflow

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of population to large agglomerations and industrial centres in the middle of the country.

The global maritime economy, including local seaports, is prone to the same laws of size economy, meaning that larger ports have better opportunities to become more flexible and occupy a broader range of niches. A mono-profile of the local port services is unsustainable and must change.

The analysis of the economic functions of Polish seaports that are not of primary importance for the national economy should be preceded by the note that some of these ports (including Police, Kołobrzeg, Darłowo, Elbląg, Stepnica, and Ustka, where cargo trading conditions are currently being improved) have developed a function characteristic for large commercial ports, i.e. transport function (transhipment and storage). In Police, it is the only, next to the industrial, economic function of the port. In the case of Kołobrzeg, Darłowo and Elbląg, this function is implemented along with other functions characteristic of local and regional ports. Due to the developing industrial function and proximity to the Kostrzyn-Słubice Special Economic Zone (Goleniów Subzone), the Stepnica seaport is characterized by high economic potential, which in a way predestines it to have a regional status. In addition to fisheries handling functions, the analysed ports also perform functions related to sailing and passenger shipping (e.g. a passenger terminal operates in Elbląg). Few ports have also developed an industrial function (examples of Police, Władysławów, Darłów, Mrzeżyno and Kołobrzeg) or commercial function connected with creating the possibility of supplying fuel to vessels (examples of Puck, Dziwnów).[14]

In the recent years, change in the business profile of small seaports on the Polish coast can be observed. Due to declining stocks and fishing quotas, especially cod, which is crucial for the profitability of fishing, the steady decline in fishing

[14] Program for the development of Polish seaports until 2020 (with a perspective until 2030), Ministry of Maritime Economy and Inland Navigation, Warsaw, 2018.

vessels could be noted. However, there are possibilities to use fisheries to activate ports and harbours, especially when combined with the development of a sports and tourist cluster. Besides, these regulations mean that a limited group of fishermen have more opportunities to make a living from fishing. Boat fisheries could, therefore, be kind of tourist attraction in small ports and harbours, as is the case in many small ports in Spain, Portugal, France or Finland. There is a sale of fresh fish straight from the boat, preliminary processing and sale of local fish dishes in numerous small gastronomy products.

An alternative to the decreasing importance of fishing activities in small seaports may be the development of other areas related to the functioning of ports. In recent years, the growing importance of recreational and leisure activities can be noticed. It is connected, for example, with the wealth of society. The increase in demand for those services might create an opportunity to switch from fishing to recreational activities, including passenger transport. However, if fish stocks are restored and fishing quotas are increased, it will be possible to rebuild the fishing fleet, which will have a positive impact on the local labour market. [15]

The transhipment function in small Polish seaports belonged to the most neglected areas of their activities. Small seaports were characterised by the lack of modern transhipment infrastructure. The existing one was largely decapitalized as well. Calls of larger commercial vessels were impossible due to parameters of access, which was affecting the volume of transhipments. The modernization of ports required significant investment outlays, exceeding the budget capabilities of port management. At the same time, the private sector showed practically no interest in implementing costly investments.[16]

The main problem in port's hinterland is the large dispersion of entities and

[15] Nowaczyk, P. (2013). Znaczenie działalności rybackiej małych portów morskich w Polsce dla lokalnego rynku pracy. Folia Pomeranae Universitatis Technologiae Stetinensis. Oeconomica, 71.
[16] Nowaczyk, P. (2017). Możliwości wykorzystania środków publicznych w rozwoju działalności przeładunkowej portu morskiego w Darłowie. Problemy Transportu i Logistyki.

their small scale of activity. It creates a problem with the concentration of economic potential necessary to stimulate, among others, the functions of small ports such as commercial and transport activities. However, it does not limit the development of tourism-related functions. Urban centres providing facilities for small seaports also cannot be the sources of demand and supply to stimulate the development of various functions of small ports. Coastal areas, due to their potential, could be a source of economic growth and sustainable development of small ports and their surroundings. Unfortunately, they are the place of the greatest structural unemployment. The current EU regional policy raises hope for improvement in the situation of small ports. The main goal of its policy is to strengthen economic and social cohesion.

The situation of small seaports is slowly improving. However, changes would not be possible without making the right investments. Works aimed at improving fishing activities consisted mainly in the modernization, expansion and construction of port quays, port basins and modernization of in-port road infrastructure. Almost each of these investments was also accompanied by the expansion of social, warehouse and renovation facilities.

In recent years, harbours have been built in Dziwnów and Darłowo and were additionally enriched with a marina in Dziwnów. In the Port of Kołobrzeg, the yacht marina was expanded, and in Jastarnia and Hel, harbours were expanded.

Investments aimed at improving transhipment operations concerned ports with noticeable transhipment growth, i.e. in Kołobrzeg and Darłowo. They consisted of modernizing or expanding the road infrastructure. Such investments allow access to the port from the hinterland. Storage and transhipment facilities were also built in the Port of Darłowo.[17]

[17] Zieziula, J., & Nowaczyk, P. (2015). Tendencje i czynniki zmian w działalności małych portów morskich w Polsce w latach 2009-2014. Marketing i Zarządzania, 1(42), 217-228.

In the future, it would also be possible to activate passenger cabotage shipping and shipping on the Baltic scale. However, this requires a tonnage exchange, which, given the shipowners 'capital weakness, will probably not be possible without public aid, and above all without a further significant increase in the Polish wealth, which is a condition for generating demand for shipping services.[18]

Meanwhile, in Sweden, out of the nine investigated local seaports, four ones are city-ports, i.e., belong to the most sustainable type of port cities which are characterised by a dynamic balance between the seaport and the adjacent urban area. The strategy of allowing the fittest and the best-positioned local ports to survive and flourish enabled the remaining Swedish local ports to become robust and competitive on the regional scale. Falkenberg is one of the good examples of how a coastal town may develop into a city-port due to an advantageous position and excellent facilities.

Rendsburg in Schleswig – Holstein (Germany) is conveniently located on the Kiel Canal. Therefore, it is gradually evolving into the city-port, a category, which is most optimal for its position. It specializes in transhipment of bulk cargo and wind turbine components. Twelve out of twenty seaports in Lower Saxony, Schleswig – Holstein and Mecklenburg – Western Pomerania are urban ports, which means that the port economy plays a minor role in the urban area. Nordenham, Sassnitz / Mukran and Stade are out-ports with the Blue economy sectors playing an essential role in the urban area development and the regional economy.

The primary role for all these three ports is to cater to the needs of the offshore wind energy sector, transportation of bulk cargo, raw and chemical industry materials, as well as petroleum products. Finally, two local seaports in Germany have achieved a dynamic balance regarding the role of the Blue Economy in the

[18] Luks, K. (2017). Port Elbląg na tle polskich portów lokalnych. Problemy Transportu i Logistyki, (1 (37)), 203-210.

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overall urban area development. These two local seaports classified as ‘city-ports’ are Cuxhaven in Lower Saxony and Stralsund in Mecklenburg – Western Pomerania.

Out of twenty-four local ports of Denmark, just Vordingborg Port has many features of the city-port type. However, unlike in Poland, the multitude of local ports in Denmark that can be classified as coastal towns (with a small population and small cargo turnover) is not a sign of structural weakness. Virtually, all residents in that country live within a 30-kilometres distance from the coast. Therefore, port customers have an extensive range of opportunities to choose which port to use for their needs. In such case, the criterion of ‘the last mile from the ship to the customer’ may become decisive, and this is where small coastal towns and their tiny harbours can find a lucrative niche in Denmark.

While analysing the navigation conditions of the entire cluster of the South Baltic local ports, it could be noticed, that particularly the Polish local ports suffer from the least permissible draft: except Police with the maximum permissible draft of 9.2 metres. Other local Polish ports have an average maximum permissible draft of 4.9 metres. Meanwhile, the local ports of Sweden are on the opposite side of this graph. Simrishamn is the shallowest local Swedish port with the maximum permissible draft of 5.5 m. All other local Swedish ports have an average maximum permissible draft of 8.9 metres which makes them very competitive not only as local but also as regional Blue Growth centres and international shipping hubs.

Naturally, since the local German and Danish ports are plenty, their maximum permissible draft is spread all over the spectrum. The median maximum permissible depth of the entire cluster of the 61 South Baltic local ports is six metres, and this is the most popular maximum permissible draft of the local ports, especially in Denmark. Eight of the 24 local Danish ports have the maximum

permissible draft exactly six metres which makes it again an indicator of an optimal depth for a seaport which is local in its functions.

The ports in coastal towns tend to have lesser maximum draft depth and can service shorter ships while out-ports and hubs, naturally, have the most profound maximum permissible draft depth and accept largest ships. On the other hand, both urban ports and city-ports quite confuse this causal relationship, and it cannot be said very firmly or be judged about the port and the town type from the maximum permissible draft and the maximum permissible ship length. Many different aspects are depending on the port capacity, its economic specialisation and development plans.

Any substantial improvement of navigation conditions requires enormous investments and might imply a substantial financial risk for the investor. For small local port municipalities, it can be a precarious business indeed. On the other hand, the cargo ship market that is eligible for regional supply will become even smaller due to draft restrictions for shallow local ports, since small, suitable vessels will be even less available. Currently, except Sweden and, to a lesser extent, Denmark, the remaining local ports of the South Baltic area suffer from poor navigation conditions limiting their development potential.

Despite regional economic development specialisation, the rule is ubiquitous: if the ports do not invest in the expansion of the land area, ensure the right depth of water or the right facilities, port companies will be disadvantaged in international competition. The optimal maximum permissible depth of a local port, which is aiming to be competitive not only on the local but also on the regional shipping market, must be between 7 metres to 10 metres, judging from the good examples of Oostende in Flanders (Belgium) and Vordingborg in Zealand (Denmark).

Despite its favourable geographical situation, Vordingborg was a typical coastal town with several marinas for leisure boats and a small commercial harbour

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with the maximum permissible draft of 6.0 metres to 7.0 metres serving mainly for the import of mineral fertilizers and the export of agricultural commodities and products from the adjacent region. In 2015, the Council of Vordingborg Municipality voted in favour of a large-scale seaport expansion in Vordingborg. The highest costs (ca. 40 million €) were related to the dredging of the entry fairway to the port till 10.4 metres and ensuring the maximum permissible draft of 9.4 metres at the quays of the port.

The expansion of the land area did not cost much since slag and fly-ash from the nearby decommissioned coal-fired power plant and recycled products from other construction projects were used as the primary material for filling-in. The expansion was accomplished in four stages and at a blistering pace. It includes a vast expansion of the land area and berths and the deepening of the fairway to 10.4 metres. With the transformation, the port of Vordingborg is becoming one of the largest commercial seaports in Zealand. The resulting social effect of the project was estimated to reach 234 full-time equivalents with private investments providing up to 909 local and regional jobs. A critically necessary precondition was to secure from the very start, that private companies commit to long-term lease conditions.

4.2. Local seaports economic impact on the surroundings

All seaports that are not essential for the national economy, both those of a regional and local nature, are substantial elements of sustainable development of coastal areas due to the opportunities that create for many different local stakeholders. Among them are entrepreneurs, fishers and tourists whom all benefit from various port functions (including transhipment, storage, industrial role, fishing and tourism). These ports are significant links in the trade processes,

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industrial production and service centres and generate new workplaces for many inhabitants.[19]

Small ports are not of primary importance for the national economy. However, they can be necessary for the development of individual regions. Therefore, local governments should have a significant impact on their activities.[20] The range of local socio-economic impact of seaports is challenging to determine most accurately and is mostly related to the communal area.[21] However, in the case of larger ports, including, for example, the port of Kołobrzeg or port of Vordingborg, it goes far beyond this area.

The location of small ports is closely related to the development of economic functions of the immediate surroundings. The operation of the port, in addition to specific financial effects, also has a reasonably broad economic impact on the immediate environment. The main, but hardly measurable economic benefits include, among others, possibilities of reducing unemployment, economic activation of the region or an increase in tax revenues.

The port's impact on the economy in the micro- and the macroeconomic sphere is complex and multidirectional. It is associated with various types of economic activities, including fisheries, transport, tourism, trade and industry. The operation and development of ports depend in no small extent on demand for services generated by these ports. Considering individual areas of port activity many growth factors can be identified. The most critical areas of impact and the corresponding spatial extent include aspects such as:

- dynamics of demographic changes on a national and regional scale,

[19] Program for the development of Polish seaports until 2020 (with a perspective until 2030), Ministry of Maritime Economy and Inland Navigation, Warsaw, 2018.
[20] Port of Kołobrzeg development strategy, Kołobrzeg. Zarząd Portu Morskiego Kołobrzeg, 2010.
[21] Nowaczyk, P. (2016). Próba określenia znaczenia portu morskiego w Kołobrzegu dla lokalnego rynku pracy. Studia Ekonomiczne, 286, 107-119.

- growth prospects for gross domestic product and value-added in the region and the country,
- changes in the volume of industrial production at the national and regional levels,
- level and trends of consumption on a national and regional scale,
- the level and trends of foreign trade development and the share of sea transport in its services.

The industrial function of the port also has a significant impact on its economic environment. Ports are convenient locations for the industry. Generally, the primary fields of industry located in seaports include:

- branches located in the areas of the port, whose location is forced technologically by access to the basin, including construction and repair of ships, fish processing, etc.,
- cargo related industries – increasing the value of the primary product.

On the scale of the entire analysed coast, there is a great diversity between municipalities in which ports and harbours are located. There are numerous economic entities of various profile and size operating in coastal areas. The spatial diversity of the number of economic entities is also relatively large, but their number decreases as the distance from more significant agglomerations increases.

Market services, which include, among others, transport and warehouse management, as well as activities related to accommodation and catering, usually have the largest share in economic activity in coastal municipalities. An important area of activity is also industrial processing or activities related to fisheries. In port cities, most companies deal with hotel services and conduct catering activities. Trade and repair, business and real estate services, industry and construction as well as transport, are also essential activities. The advantage of the tourist function is visible.

In Eastern Europe, the economic environment of local ports is also not conducive to their development. They are adjacent to agricultural lands, and the small local industry does not generate enough maritime transport needs. There is also a decrease in catches. Thus, a decrease in the number of cutters and fishing boats based in small ports and harbours. Not without significance is the fact that small ports usually serve areas with very low population density.

The relations of seaports with towns and the development of these seaport towns have been classified in different typologies (Merk 2018). Depending on the relative dominance of the seaport and its urban area, Ducruet and Lee (2006) established a typology of nine types of the municipal port entities, ranging from coastal port towns to the world seaport cities.[22] The principal notion embedded into the typology is that similar types of municipal port entities have similar challenges, e.g. seaport towns with relatively small population size, but huge ports all face the challenge of an urban economy that risks being too seaport dependent.

Almost all local and regional ports and urban areas in the South Baltic area fall within the categories of coastal port towns, urban ports or 'out-ports'. Meanwhile, Oostende in Flanders, Cuxhaven in Lower Saxony, and five ports in the South Baltic area can be classified as a 'city-port', i.e., an optimal version of relations between the urban area and the port.

[22] Ducruet, C., Lee. S.W. (2006). Frontline soldiers of globalisation: port-city evolution and regional competition. GeoJournal 67

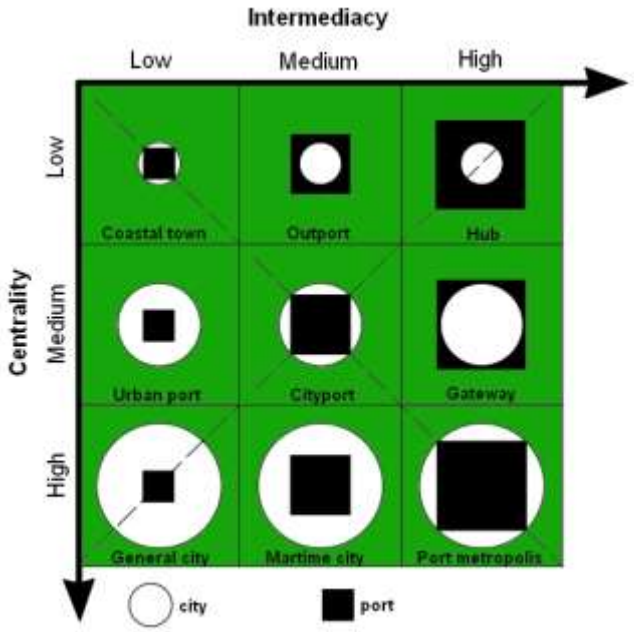

Figure 62. A matrix of relations between urban areas and ports

Source: own elaboration based on Ducruet, C., Lee. S.W. (2006). Frontline soldiers of globalisation: port-city evolution and regional competition. GeoJournal 67 (2): 107-122.

According to Ducruet and Lee (2006), a 'city-port' is a port city, which manages to keep a balanced combination of centrality and intermediacy. Meanwhile, coastal port towns and urban ports are categorised by a low intermediator's function of the seaports in the overall economic structure of the urban area. In contrast, the town itself is categorised by low to medium centrality as an urban functional measure, i.e., the urban port has some importance in the urban system but with limited port activity. Ducruet and Lee (2006) also emphasize that the seaport and urban area relationships are very volatile and vary over time.

IWW E 60 in the South Baltic region runs along 25 subregions (NUTS 3). The length of the IWW E 60 measured from Germany's Northwest Mecklenburg

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subregion, along its course up to the Lithuanian Klaipeda subregion is about 900 km. These subregions cover an area of 132 359.6 km^2, and in 2017, they were inhabited by 9 962 269 people[23] Such population means noteworthy social potential that has a significant impact on the economies of individual countries in the whole South Baltic Region.

Table 2.

Size and function of the target ports along the IWW E 60

Port	Country	Region (NUTS2)	Population	Handling capacity, thousand tonnes	Type
Oostende	Belgium	West Flanders	71 332	2 000	CP
Assens	Denmark	South Denmark	6 155	359	CT
Fåborg	Denmark	South Denmark	7 049	77	UP
Hanstholm	Denmark	North Jutland	2 154	532	OP
Hobro	Denmark	North Jutland	12 083	268	CT
Horsens	Denmark	Central Jutland	59 181	838	UP
Hundested	Denmark	Zealand	8 597	366	CT
Hvide Sande	Denmark	Central Jutland	2 968	173	CT
Korsør	Denmark	Zealand	14 647	493	CT
Næstved	Denmark	Zealand	43 440	486	UP
Nakskov	Denmark	Zealand	12 691	500	CT
Nexø	Denmark	Capital Region	3 615	25	UP
Nykøbing F	Denmark	Zealand	16 770	500	CT
Nykøbing M	Denmark	North Jutland	9 135	68	UP
Orehoved	Denmark	Zealand	424	124	OP
Rødby	Denmark	Zealand	1 624	100	CT
Skagen	Denmark	North Jutland	8 003	293	CT

[23] Eurostat, appsso.eurostat.ec.europa.eu.

Port	Country	Region (NUTS2)	Population	Handling capacity, thousand tonnes	Type
Skive	Denmark	North Jutland	20 599	144	UP
Søby	Denmark	South Denmark	3 000	84	CT
Sønderborg	Denmark	South Denmark	27 801	108	UP
Struer	Denmark	North Jutland	10 301	170	CT
Stubbekøbing	Denmark	Zealand	2 271	20	UP
Thisted	Denmark	North Jutland	13 423	88	CT
Vordingborg	Denmark	Zealand	12 000	502	CP
Årøsund	Denmark	South Denmark	305	10	CT
Brake	Germany	Lower Saxony	14 965	5 700	CT
Büsum	Germany	Schleswig-Holstein	4 928	120	CT
Cuxhaven	Germany	Lower Saxony	48 371	2 700	CP
Eckernförde	Germany	Schleswig-Holstein	21 902	200	UP
Elsfleth	Germany	Lower Saxony	9 105	100	UP
Flensburg	Germany	Schleswig-Holstein	89 504	500	UP
Glückstadt	Germany	Schleswig-Holstein	11 069	200	CT
Heiligenhafen	Germany	Schleswig-Holstein	9 211	100	UP
Husum	Germany	Schleswig-Holstein	23 158	380	UP
Itzehoe	Germany	Schleswig-Holstein	31 879	100	UP
Kappeln	Germany	Schleswig-Holstein	8 619	50	UP
Neustadt	Germany	Schleswig-Holstein	15 093	100	UP
Nordenham	Germany	Lower Saxony	26 193	2 700	OP
Oldenburg	Germany	Lower Saxony	168 210	110	UP
Papenburg	Germany	Lower Saxony	37 579	580	UP
Rendsburg	Germany	Schleswig-Holstein	28 470	420	UP
Sassnitz	Germany	Mecklenburg-Vorpommern	9 320	4 900	OP

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Port	Country	Region (NUTS2)	Population	Handling capacity, thousand tonnes	Type
Stade	Germany	Lower Saxony	47 533	5 300	OP
Stralsund	Germany	Mecklenburg-Vorpommern	59 421	1 900	CP
Uetersen	Germany	Schleswig-Holstein	18 496	50	UP
Darłowo	Poland	West Pomerania	14 000	337	CT
Dziwnów	Poland	West Pomerania	2 700	10	CT
Hel	Poland	Pomerania	3 276	20	CT
Kołobrzeg	Poland	West Pomerania	46 500	500	UP
Police	Poland	West Pomerania	33 000	2 900	OP
Ustka	Poland	Pomerania	15 700	40	CT
Władysławowo	Poland	Pomerania	10 000	221	CT
Falkenberg	Sweden	West Sweden	27 813	500	CT
Kalmar	Sweden	Småland and the islands	41 110	1 500	CP
Landskrona	Sweden	South Sweden	33 308	800	CP
Lysekil	Sweden	West Sweden	7600	500	CT
Simrishamn	Sweden	South Sweden	6 883	100	UP
Sölvesborg	Sweden	South Sweden	8 870	1 000	OP
Uddevalla	Sweden	West Sweden	36 121	1 100	CP
Varberg	Sweden	West Sweden	35 782	2 000	CP
Åhus	Sweden	South Sweden	10 341	1 000	OP

Abbreviations: CP – City-port; CT – Coastal town, UP – Urban port, OP – Out-port

Source: own elaboration based on ports' webpages.

In Poland, seven local ports situated rather consistently along the entire Polish Baltic seacoast from the German border to the Russian border are the area of interest of the present study (from west to east): Police, Dziwnów, Kołobrzeg, Darłowo, Ustka, Władysławowo, and Hel. The most complicated situation with

local ports is in Sweden because historically many tiny local ports were scattered along the entire Swedish Baltic Sea and Western coast. However, due to the commercial fishing crisis in the Baltic Sea in recent decades, they have almost completely disappeared from the map of the local economy.

For example, on Öland Inland, the depopulation in the south of the island took place because traditional commercial fisheries have disappeared and most of the local harbour settlements like Grönhögen**,** or even Degerhamn**,** which served as an out port for a cement production plant, have decreased in population size. These former local hubs of commercial fisheries have ceased to exist to the level that it is impossible to consider them as local economic factors and future sustainable development stimulus. The global maritime economy, including local seaports, is prone to the same socio-economic laws. Unfortunately, the larger ports have better opportunities to become more flexible and occupy a broad range of niches.

Concentration is the primary trend with the largest seaports attracting more ships and ancillary services. This 'vicious circle' eliminates any opportunities for the smallest fishing harbours on depopulated coastlines to survive in the long-term struggle since they need significant additional large investments to reposition themselves. Out of the four small local ports on Bornholm island, only Nexø and Rønne have some chances to prosper in the long-term. On the other hand, those local ports who manage to maintain and strengthen their role as the last remaining fishing harbours of a regional scale, like Swedish Simrishamn, can enjoy long-term prosperity.

The lack of strong local port industries and varied services also causes a fierce struggle on the Danish scene of local ports. Many local Danish commercial harbours serve a rather simple role serving as interfaces for importing mineral fertilizers, mainly from Norway, for local farmers. They also export agricultural commodities and products – grain, vegetables, sugar, molasses, meat – abroad

using local harbours with silos. Such a port business model causes significant seasonality and year-to-year volatility of local port operations.

During the last decade, many local ports in Poland served mainly for importing crushed stone from Scandinavia to be used for the intensive construction of motorways in the country, especially in its northern part. Similar functions of local ports were typical for many German local ports 20 to 30 years ago, especially in Mecklenburg – Western Pomerania. Such a mono-profile of the local port services was unsustainable and had to be changed. The reason for the change was the declining demand for the Scandinavian crushed stone after the peak of the motorway construction programme has subsided.

After a thorough investigation of over 60 local ports in the South Baltic area, it can be concluded, that the question on what the role of the port on the surrounding region is erroneously formulated. It should be instead asked, what is the influence of the surrounding region on the wellbeing, competitiveness and viability of local ports. This analysis can be done in many different aspects – from investigating the perspectives of production specialisation of the region, cargo traffic throughput within its territory, innovation performance of the region, as well as many other different aspects and perspectives.

Ducruet and Itoh (2016)[24] have elicited the following six types of port regions: metropolitan region, industrial cluster, domestic gateway, distribution hub, peripheral, and mono functional. ***Metropolitan regions*** are specialized in the tertiary sector, richer (GRP per capita) and denser but with a higher unemployment rate than the national average. These urban regions concentrate most valued traffics (general cargo) as well as energy flows (liquid bulks) and imports, while being more international. ***Industrial clusters*** are comparable to the metropolitan regions

[24] Ducruet, C., Itoh, H. (2016). Regions and material flows: investigating the regional branching and industry relatedness of port traffics in a global perspective. Journal of Economic Geography, 16(4): 805-830.

as they are more productive than the national average and specialized in imports, international traffics, and general cargo. However, these regions differ by their specialization in the secondary sector and by lower unemployment rate and population density.

Residential gateways are usually inland locations served by river or canal transport. They are specialized in exports and domestic flows, solid bulks and some general cargo, with a slight specialization in the secondary (including mining) and tertiary sectors. Their primary function is thus to distribute cargo locally and nationally mainly based on the local production of semi-finished goods and natural resources. ***Distri-hubs*** are without any specific specialization in economic sector; these regions handle a majority of raw materials (solid and liquid bulks) and imports. Because port traffics are not associated to a specific economic sector, these regions are marked by a particular logistical-territorial mismatch whereby host regions are passed through to serve other regions (or internationally), often inland (but also other coastal regions).

The above types of port regions are rare in the South Baltic area. Only the region of Rendsburg – Eckernförde in Schleswig – Holstein could be characterized as a domestic gateway thanks to a large amount of the Kiel Canal passes through Rendsburg – Eckernförde. It is one of the largest districts in the whole of Germany. There are also several other South Baltic sub-regions where local ports are in the vicinity of more significant industrial hubs and ports that are specified in the region. For instance, Police in Poland lies between Szczecin, the largest regional industrial hub and Świnoujście, a large seaport. The whole Szczecin agglomeration can be typified as a distri-hub, but only partially because of Police.

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Most of the local port regions in the South Baltic area are ***peripheral*** ones. Such regions, according to Ducruet and Itoh (2016) [25], are very much specialized in the primary sector, with a low population density and below-average productivity (lower GRP per capita). These regions do not show any strong specialization of their port traffics, the exception being a more domestic and export profile. This vital category by its number of regions all over the world is evidence of a functional and spatial mismatch between port traffic and local economic structure of the port regions.

Remarkably, Ducruet and Itoh (2016) [26] mention explicitly one region (Weser-Ems in the German federal state of Lower Saxony) that falls within the scope of this study. They classify the region as a ***mono-functional*** one. Only a few regions worldwide fall into this category. These regions concentrate on North America's east coast and in Europe. Ducruet and Itoh (2016) argue that their traffic specialization in liquid bulks and general cargo does not seem to favour regional socio-economic welfare. It is more likely to reflect upon their high dependence on general cargo imports due to less industry.

According to Ducruet and Itoh (2016)[27], the socio-economic difficulties of coastal regions, such as higher unemployment levels and lower productivity, seem to be accentuated by peripherality and disequilibrium in the traffic structure of ports. The size of the adjacent economy explains a large proportion of port throughputs; throughput specialization primarily reflects local economic specialization. The path-dependency of traffic specialization suggests that port development can drive regional development only under certain conditions. Reviving local economies that face significant socio-economic difficulties through

[25] Ducruet, C., Itoh, H. (2016). Regions and material flows: investigating the regional branching and industry relatedness of port traffics in a global perspective. Journal of Economic Geography, 16(4): 805-830.
[26] Ibidem
[27] Ibidem

attracting new cargo flows may not always be the right option if policymakers do not think of the link with local industries.

Most of the South Baltic local ports, however, have significantly evolved in the 2000s. Every South Baltic town and its port have acquired new features in the last two decades. It also applies to the smallest coastal towns. Each port has its business base and services. On the other hand, quite a few superficial observers tend to overestimate the impact of local ports not only on the surrounding region but on the local labour market as well.

Since, as mentioned, neither cargo turnover, nor employment figures can be used as appropriate indicators which are suitable to express any positive synergy between local ports and their regions adequately, it is worth taking a closer look into the South Baltic local ports and their regions as existing or potential innovation hubs. It can be assumed that Community Design (CD) applications per million of inhabitants can reflect the innovation performance of NUTS 3 coastal regions (as a proxy for the total economic value-added of both, maritime and non-maritime sectors).

Community Design is a unitary industrial design right that covers the European Union. It has both unregistered and registered forms. The unregistered Community Design right came into effect on March 6, 2002. Meanwhile, the registered Community Design right became available from April 1, 2003. The European Union provides the latest data on Community Design (CD) applications per million of inhabitants for the NUTS 3 regions for 2015. Therefore, the assessment of dynamism of the South Baltic NUTS 3 regions in terms of Community Design applications between 2010 and 2015 would be a more objective indicator of innovation performance of the local port regions.

The average number of Community Design (CD) applications per million of inhabitants between 2010 and 2015 in the South Baltic NUTS 3 regions with the

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investigated local ports shows the convincing leadership of the Danish NUTS 3 regions among local ports in the entire South Baltic area (Table 3, Figure 63). Considering the mentioned indicator, all 32 surveyed regions can be classified into six different groups:

- top-notch innovative local port regions,
- higher-level innovative local port regions,
- high-level innovative local port regions,
- medium-level innovative local port regions,
- lower-level innovative local port regions,
- least-innovative local port regions.

Table 3.

Community Design applications per million of inhabitants between 2010 and 2015 in the South Baltic NUTS 3 regions with the investigated local ports

NUTS 3 region (local ports in brackets)	2010	2011	2012	2013	2014	2015	Average
Oostende (Ostend)	6.63	13.11	26.04	19.50	6.47	12.9	14.11
Vorpommern-Rügen (Stralsund, Sassnitz/Mukran)		13.26	4.45	8.94		13.42	10.02
Cuxhaven		5.02	5.05	5.07	5.09	5.08	5.06
Stade	5.08	10.24	10.22			5.06	7.65
Osnabrück		19.05	19.02	12.61	12.53	18.64	16.37
Emsland (Papenburg)	12.78	25.72	22.46	35.16	15.94	22.17	22.37
Wesermarsch (Brake, Elsfleth, Nordenham)			11.17	11.22			11.20
Flensburg	11.3	12.16	12.08	59.91	11.91	59.04	27.73
Dithmarschen (Büsum)		14.90				7.54	11.22
Nordfriesland (Husum)		24.46	12.27	12.33	18.53	18.5	17.22

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NUTS 3 region (local ports in brackets)	2010	2011	2012	2013	2014	2015	Average
Ostholstein (Heiligenhafen, Neu-stadt)	9.76	30.20	10.10	10.11	10.11	5.04	12.55
Pinneberg (Uetersen)	29.76	33.8	33.64	23.43	122.83	46.04	48.25
Rendsburg-Eckernförde	11.09	11.13	29.76	14.92	11.19	14.89	15.50
Schleswig-Flensburg (Kappeln)	60.48	61.13	71.53	82.09	51.25	71.58	66.34
Steinburg (Glückstadt, Itzehoe)	15.00			7.66		7.68	10.11
Nordsjælland (Hundested)	42.56	73.68	120.46	82.42	71.07	92.74	80.49
Bornholm (Nexø)	23.67	23.87				25.05	24.20
Vest- og sydsjælland (Korsør, Næstved, Nakskov, Nakskov, Ny-køb ing F, Orehoved, Rødby, Stubbekøb ing, Vordingborg)	22.18	29.10	42.99	29.36	24.23	38.02	30.98
Fyn (Assens, Søby)	78.37	53.61	51.53	80.30	65.75	51.17	63.46
Sydjylland (Sønderborg, Årøsund)	54.51	78.25	55.85	48.9	82.43	96.21	69.36
Vestjylland (Hvide Sande, Skive, Struer)	74.93	79.65	91.34	93.78	77.51	86.91	84.02
Østjylland (Horsens)	72.56	85.12	100.03	82.75	91.57	91.01	87.17
Nordjylland (Hanstholm, Hobro, Nykøb ing M, Skagen, Thisted)	37.96	39.67	37.93	39.64	51.63	25.75	38.76
Koszalinski (Darlowo, Kolo-brzeg)					25.46	5.67	15.56
Szczeciński (Dziwnów, Police)					5.95	15.85	10.90
Gdański (Hel, Władysławowo)	21.30	26.65	24.39	37.04	20.13	19.88	24.90
Slupski (Ustka)					24.27	27.31	25.79
Kalmar	42.8	47.1	12.87	21.41	29.93	16.98	28.52
Blekinge (Sölvesborg)	72.09	45.68	26.15	45.96	45.82	45.41	46.85
Scania (Landskrona,	45.49	62.73	66.24	83.13	74.56	64.4	66.09

NUTS 3 region (local ports in brackets)	2010	2011	2012	2013	2014	2015	Average
Simrishamn, Åhus)							
Halland (Falkenberg, Varberg)	70.75	33.39	56.34	42.75	71.70	32.19	51.19
Västra Götaland (Lysekil, Udde-vala)	65.63	66.44	67.27	74.35	61.30	63.73	66.45

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

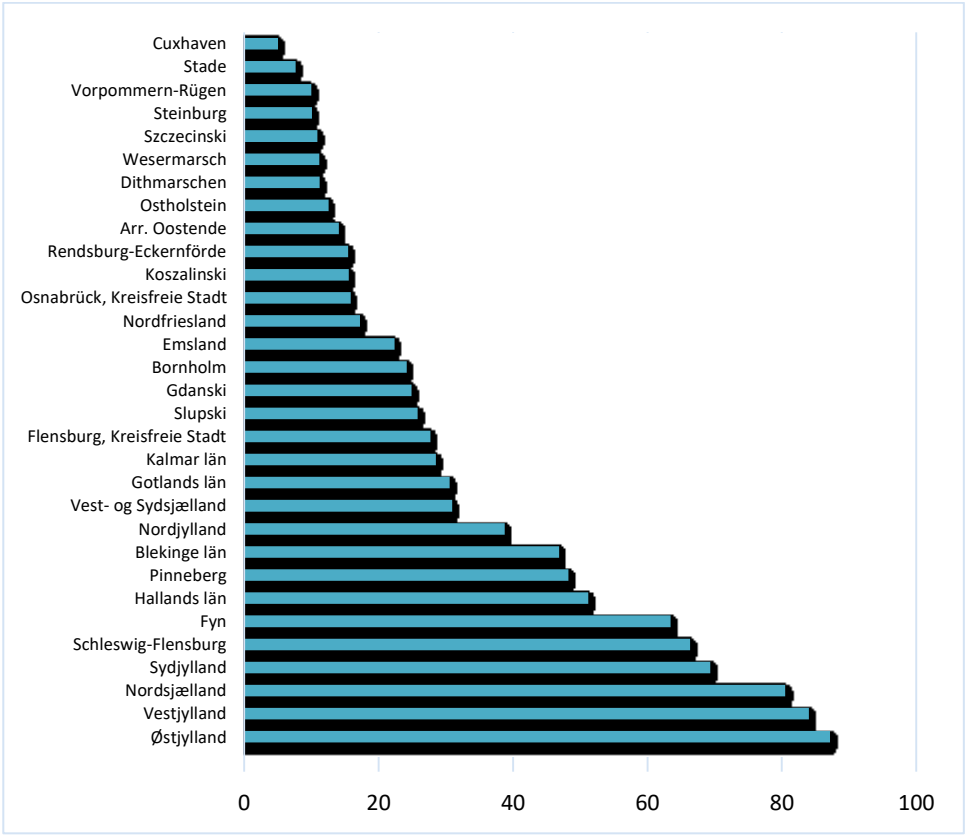

Figure 63. Community Design applications per million of inhabitants between 2010 and 2015 in the South Baltic NUTS 3 regions

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

Top-notch innovative local port regions

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Three Danish NUTS 3 regions with local ports belong to this group with the average number of Community Design (CD) applications per million of inhabitants between 2010 and 2015 ranging from 80.49 in North Zealand (Nordsjælland) to 84.02 in West Jutland (Vestjylland), to the highest one of 87.17 in East Jutland (Østjylland). It is, however, difficult to elicit what is an exact contribution of the investigated local ports in these three regions – Hundested in North Zealand, Hvide Sande, Skive and Struer in West Jutland and Horsens in East Jutland – into such a high innovation level of these regions. These local seaports play only a secondary or even a tertiary role in the economy and innovations in these regions.

North Zealand is the common name for the northernmost part of the island of Zealand. Northeast Zealand and Copenhagen are not part of North Zealand. However, the high level of innovativeness of North Zealand as a NUTS 3 level statistical region is largely predetermined by its vicinity to the Capital Region with Copenhagen as a world-level innovation centre (Copenhagen has been ranked as the 14th most inventive city in the world based on the number of patents for every 10 000 residents, according to the Organization for Economic Cooperation and Development). Many peri-urban innovative enterprises scattered along the coast of the Kattegat in North Zealand is the reason for a high, albeit a somewhat variable level of region's innovativeness throughout the recent years.

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Figure 64. Community Design applications per million inhabitants in North Zealand

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

A very high level of innovativeness of West Jutland is a much more complex case than the one of North Zealand since there are no essential innovation centres in the region. It might be caused by the lowest population density of this region compared to other South Baltic NUTS 3 regions. West Jutland might be the region where the three local ports and the enterprises located in their area play an essential role in raising the innovativeness level of the region (Figure 65) indeed. There are several high-tech enterprises in the local ports of West Jutland. At the Atlantic Sapphire Farm, for instance, located in Hvide Sande Port, salmon are raised in a revolutionary BluehouseTM – a kind of a Greenhouse where fish grow in ideal conditions.

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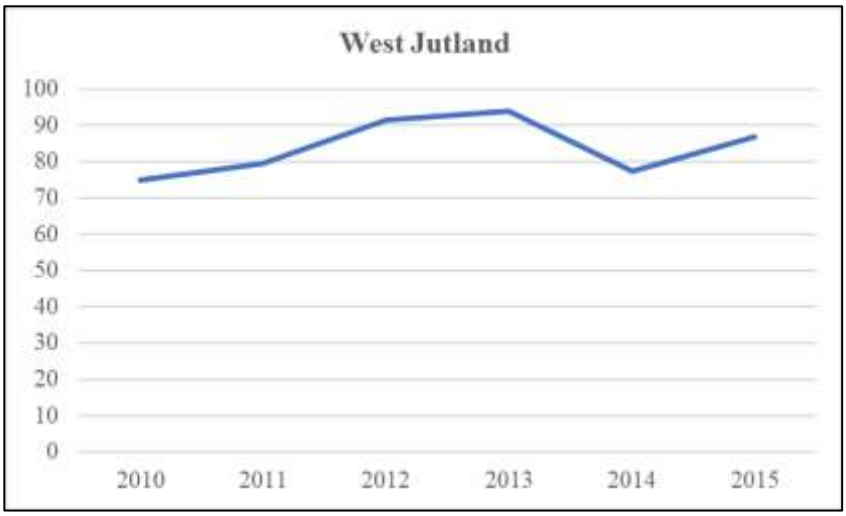

Figure 65. Community Design applications per million of inhabitants in West Jutland

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

The case of East Jutland, the most innovative region in the South Baltic area, is very different from West Jutland. East Jutland as a NUTS 3 region covers the eastern part of the Jutland Peninsula with Aarhus as its largest city and Horsens Port playing only a minor role in shaping the innovativeness of the region (Figure 66). According to the World Economic Forum, Aarhus heads the chart as the World's most mindful city. It is also regularly listed in the top 25 of World's most inventive cities. In 2011, wind turbine manufacturer Vestas relocated its head office to Skejby A/S in northern Aarhus, while Terma A/S produces high-tech products including aerospace and satellite technology and radar systems in Lystrup (a suburb of Aarhus).

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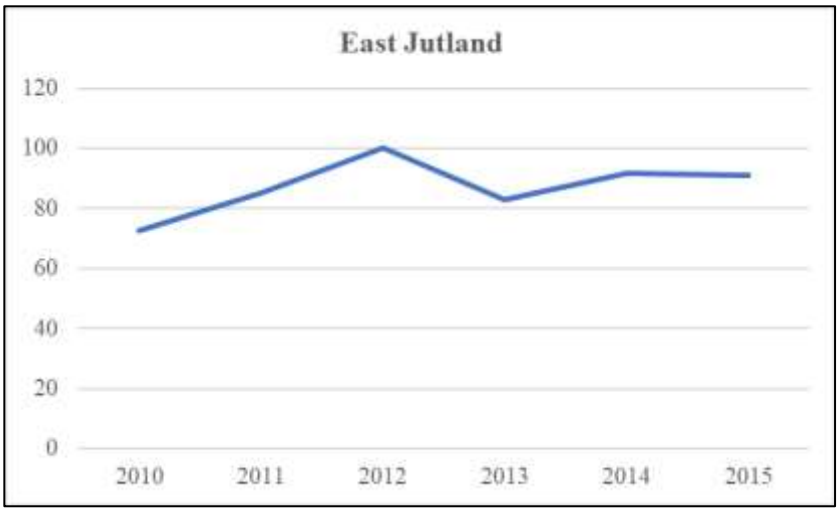

Figure 66. Community Design applications per million of inhabitants in East Jutland

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

However, East Jutland is an excellent example of the region functioning as an innovation cluster with peri-urban small and medium-sized innovative enterprises being integral links in the value chains participating in product design, R & D, production of components and advertising. Wind turbine manufacturer Vestas, for instance, subcontracts local companies in East Jutland providing services for R & D and production of innovative wind turbine components. Although enterprises in Horsens are not part of the smartest regional value chains of East Jutland, Hamlet Protein A/S located in the port of Horsens is an innovative enterprise of R & D and production of patented soy-based proteins for animal feed.

Higher-level innovative local port regions

The higher-level innovation group of the South Baltic NUTS 3 regions is more diverse than the group of top-notch innovative local port regions in geographical terms. Along with the Danish regions of Fyn and South Jutland, there are also two regions from Sweden (Västra Götaland and Scania counties) as well as the

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Schleswig-Flensburg region in Germany. The average of Community Design applications per million of inhabitants between 2010 and 2015 in this group of South Baltic NUTS 3 regions range from 63.46 in Fyn to 69.36 in South Jutland with the three Swedish and German NUTS 3 regions ranked between the two Danish ones.

Although this group is quite a homogeneous one considering the average values of the innovation indicator, the South Jutland region, however, has shown a remarkable growth of the indicator in the latest three surveyed years for which the data is available (Figure 67). Two of the three Denmark's largest seaports – Esbjerg and Fredericia are in South Jutland. They are the most significant innovation hubs in both maritime and non-maritime sectors of the economy. However, a Sønderborg-based global ICT company Hansen Technologies Denmark A/S has its international headquarters in the northern harbour area of Sønderborg Port, which is one of the investigated local South Baltic ports in South Jutland.

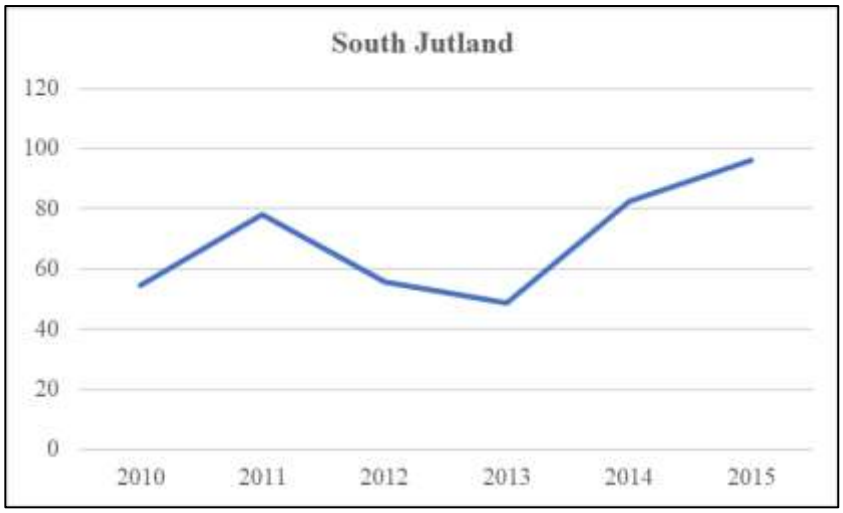

Figure 67. Community Design applications per million of inhabitants in South Jutland

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Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

The other four higher-level innovative South Baltic local port regions show a somewhat similar level and pattern of the innovativeness dynamics throughout the years for which the data is available (Figure 68). Notably, the significant share of the innovativeness is like the cases of other regions due to the large cities which are innovation hubs and large seaports delivering innovations in both maritime and non-maritime sectors. For instance, Gothenburg, Swedish second-biggest city and the economic centre of Västra Götaland County has been ranked as the 12th-most inventive city in the World by the OECD. What is more, Malmö, Swedish third-biggest city and the economic centre of Scania County has been ranked as high as the 4th-most inventive city in the World by the OECD.

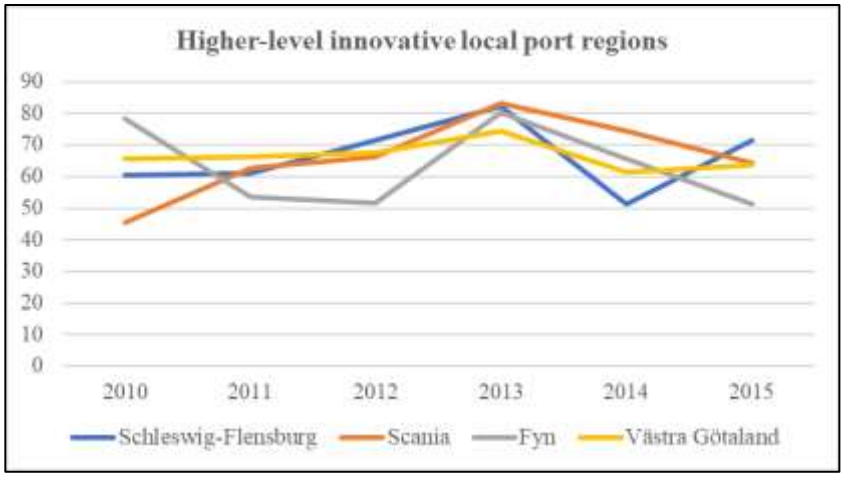

Figure 68. Community Design applications per million inhabitants in higher-level regions

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

High-level innovative local port regions

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The high-level innovation group of the South Baltic NUTS 3 regions comprises just four regions with the average number of Community Design (CD) applications per million of inhabitants between 2010 and 2015 ranging from 38.76 in North Jutland (Denmark) to 46.85 in Blekinge (Sweden), to 48.25 in Pinneberg (Federal State of Schleswig – Holstein in Germany), and 51.19 in Halland (Sweden). Comparatively lower values of the Community Design applications per million of inhabitants in these four NUTS 3 regions are caused by the absence of large innovation hubs in the maritime and non-maritime sectors. These four cases reflect the real impact of local ports on the innovativeness of the regions.

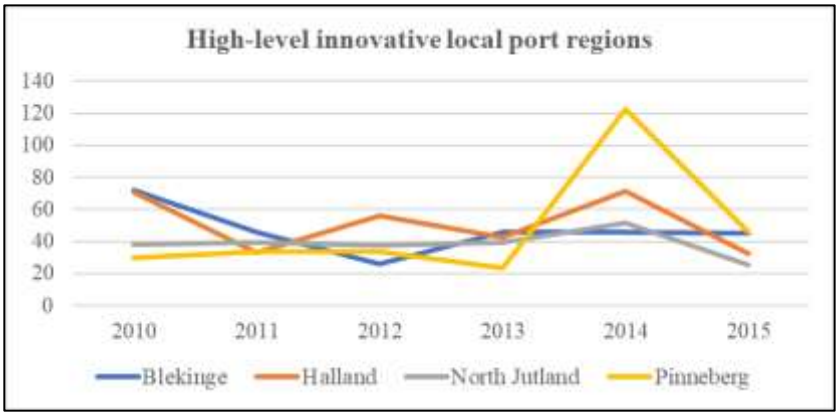

Figure 69. Community Design applications per million inhabitants in high-level regions

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

The innovativeness spike of the Pinneberg region in 2014 is surprising. Although the port of Uetersen is currently almost defunct due to siltation and the maximum permissible draft of 2 metres. The port area hosts a pharmaceutical company Nordmark specializing in gastrointestinal drugs and producing active ingredients collagenase and pancreatin. The Pinneberg region (including Uetersen) is famous as the European largest nursery of roses with such companies as Kordes,

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Rosen Tantau and BKN Strobel dominating the world market for rose strains. Uetersen is also an industrial and business location with over 1000 companies. One of the largest companies is the Feldmuehle company in Uetersen, which specializes in the production of photo printing paper and wet-strength label paper. Hence possible reasons for the surprising innovation spike in 2014.

Medium-level innovative local port regions

The medium-level innovation group of the South Baltic NUTS 3 regions comprises seven regions with the average number of Community Design (CD) applications per million of inhabitants between 2010 and 2015 ranging from 22.37 in Emsland region in the federal state of Lower Saxony (Germany) up to 30.98 in the West and South Zealand NUTS 3 region of Denmark (Figure 70). Surprisingly, such centrally and conveniently located areas like West and South Zealand, Emsland, Flensburg, Kalmar or Gdańsk fall into the category of medium-level innovative local port regions. It is also challenging to find good reasons for the justification of such unexpected results.

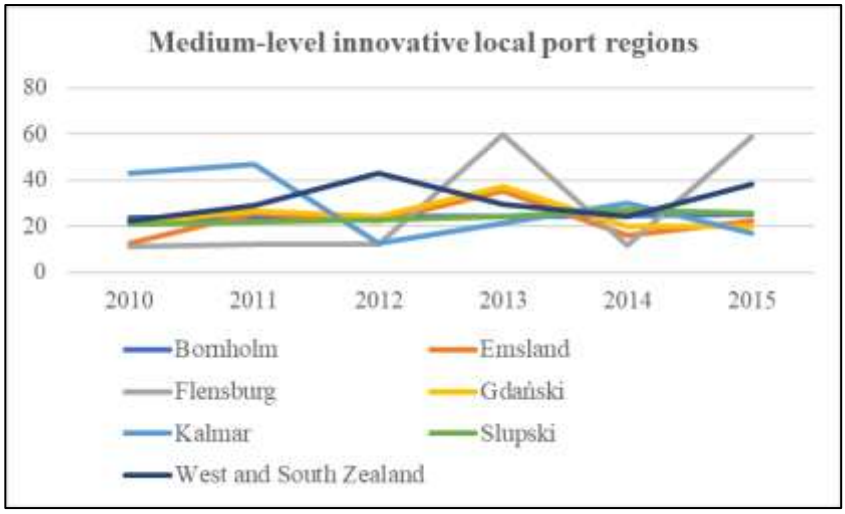

Figure 70. Community Design applications per million inhabitants in medium-level regions

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Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

The answer might lie in the Flensburg city-region in the federal state of Schleswig – Holstein of Germany, which shows extreme volatility in the innovativeness level on an annual basis. Flensburg is the city on the German-Danish border with strong traditions of the port economy. Currently, two large enterprises are in the port area of Flensburg. One is Flensburger Fahrzeugbau Gesellschaft mbH (FFG). It is a medium-sized structured company active in the field of defence technology repair, vehicle construction and vehicle retrofitting. Another one is Flensburger Schiffbau-Gesellschaft mbH (FSG) shipyard. It specialises in the construction of modern Ro-Ro ferries. The shipyard became the market leader in this segment. Therefore, recent financial volatility of the shipyard might be the cause of Flensburg's volatility in the innovativeness level.

Lower-level and least-innovative local port regions

Finally, the lower-level and least-innovation groups of the South Baltic NUTS 3 regions comprise as many as 13 regions (40.6% of all surveyed regions) with the average number of Community Design (CD) applications per million of inhabitants between 2010 and 2015 ranging from 5.06 in the case of Cuxhaven in the federal state of Lower Saxony up to 17.22 in North Frisia (Nordfriesland) NUTS 3 region in the federal state of Schleswig – Holstein both in Germany (Table 4). Surprisingly, Oostende NUTS 3 region where the port of Oostende is located also falls within this weakest category.

Table 4.

Community Design applications per million of inhabitants between 2010 and 2015 in the South Baltic lower-level and least-innovative local port regions

NUTS 3 region	Local ports	Country	Average	Port type
Nordfriesland	Husum	DE	17.22	UP

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NUTS 3 region	Local ports	Country	Average	Port type
Osnabrück	Osnabrück	DE	16.37	UP
Koszalinski	Darłowo, Kołobrzeg	PL	15.56	CT, UP
Rendsburg-Eckernförde	Rendsburg, Eckernförde	DE	15.50	UP
Oostende	Ostend	BE	14.11	CP
Ostholstein	Heiligenhafen, Neustadt	DE	12.55	UP
Dithmarschen	Büsum	DE	11.22	CT
Wesermarsch	Brake, Elsfleth, Nordenham	PL	11.20	CT, UP, OP
Szczeciński	Dziwnów, Police	DE	10.90	CT, OP
Steinburg	Glückstadt, Itzehoe	DE	10.11	CT, UP
Vorpommern-Rügen	Stralsund, Sassnitz/Mukran	DE	10.02	CP, OP
Stade	Stade	DE	7.65	OP
Cuxhaven	Cuxhaven	DE	5.06	CP

Abbreviations: CP – City-port; CT – Coastal town, UP – Urban port, OP – Out-port

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

The above table shows that the innovativeness level of the NUTS 3 regions in the South Baltic area has no close interdependence with the port type. It is no surprise that out-ports, which serve only as transhipment terminals have no impact on the innovativeness level of the adjacent region. However, it is indeed surprising, that Oostende, Cuxhaven and Stralsund, three city-ports, i.e., the cities and the neighbouring areas characterized by an optimal balance in terms of the port economy and the city size, suffer from a low innovativeness level. It is also remarkable that none of the Scandinavian NUTS 3 regions has fallen into this lowest innovativeness category.

There might be different reasons for such a low innovativeness level of these three city-ports. In case of Oostende and Cuxhaven, the primary reason might be

their struggle to find the competitive niche in the "urban shadow" of the nearby port metropolises in densely populated and economically most advanced regions of Europe. The lesser port regions facing functional and spatial port-region mismatch tend to either support value-added creation or shift the focus towards non-port activities.[28] Oostende is aiming to opt for the first option as a more sustainable and competitive one in the long-term.

4.3. Ports' influence on the local employment

The small seaport is one of the main factors affecting the economic activity of coastal municipalities. Ports generate economic effects in terms of employment and value-added. The employment and value-added per tonne increase in case the goods undergo logistics and industrial transformations in the port area.

Seaports, due to the complexity of their functions, have always been a great labour market, especially the so-called simple work. However, along with technological changes within individual port functions, and the transport function, the importance of ports as a source of quantitative labour demand decreases, similarly to industry. However, the importance of qualified workers is increasing. Port labour force are very dependent on the structure cargo flows handled in the port. Port system employs a large labour force linked to ships loading and unloading operations, ship operations and services (agencies, pilotage, towage and bunkering), land transport, logistics activities, cargo service (e.g. freight forwarding and customs brokering), industrial production and government agencies. From the port-region relationship, it is difficult not to notice the relationship between the port's development opportunities and the possibilities of

[28] Ducruet, C., Itoh, H., Joly, O. (2015). Ports and the local embedding of commodity flows. Papers in Regional Science, 94 (3): 607-627.

acquiring qualified staff.

Therefore, a change in the port-region relationship has been observed in recent years. It is not the port that is the city's development impulse, but the port's development depends on the impulses flowing from its surroundings. It applies to both education and the port's accessibility from the hinterland, which was the traditional "contact" of the city and the port, as well as a new problem – joint port-city activities for the optimal use of both urban and port space.

One of the examples of mutual port-city development impulses is the idea of a cluster. The seaport is the fundamental basis for industrial clusters and not just those that can be described as maritime. The most predestined to become the basis of a cluster in a seaport are the so-called enterprises' strict maritime industries, i.e. those that can only exist with access to water, and therefore mainly all types of shipyards, and in the case of regional ports, yachts and shipbuilding / repairing small vessels and the fishing industry. All other types of industrial companies choose a port location based solely on their economic calculations. However, the creation of a cluster can take place only after reaching a stage of development of a specific set of enterprises.

The labour market in the analysed countries has been very diverse for the past ten years. The highest unemployment rate was recorded in Lithuania[29], and it currently amounts to 6.3%. However, it should be noted that the situation on the labour market has improved significantly in recent years; in 2015, unemployment amounted to 9.1%, and in 2010 it reached almost 18%.

In 2019, the highest unemployment rate was recorded in Sweden, and it amounted to 6.8%. The lowest unemployment occurs in Poland and Germany - 3.3% and 3.2%, respectively.

[29] CEE: unemployment rate 2018-2019 | Statista. https://www.statista.com/statistics/1072993/cee-unemployment-rate/

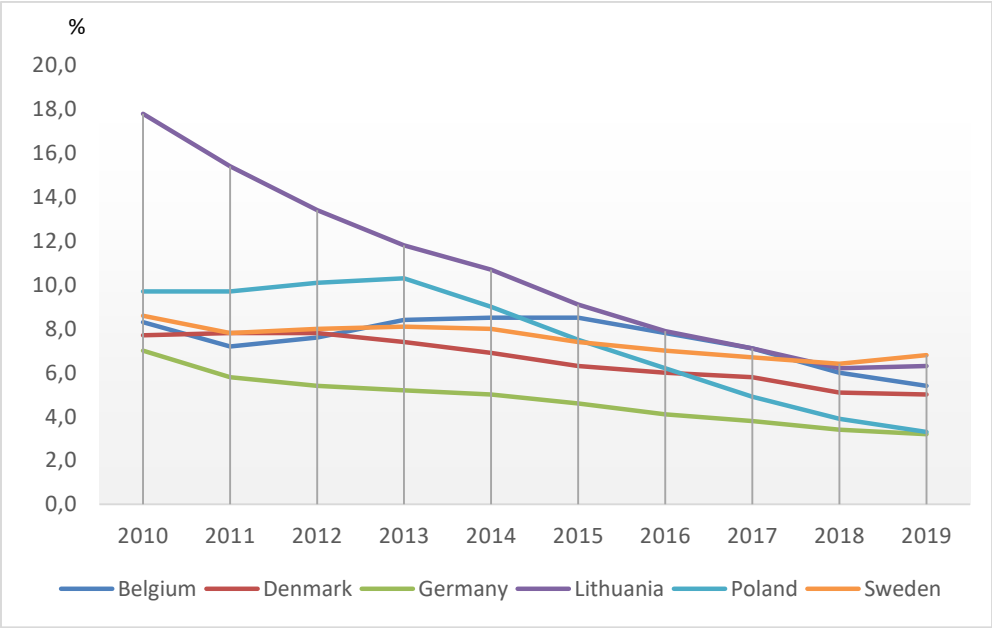

Figure 71. Unemployment in analysed countries (percentage of the active population)

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

It is also worth paying attention to the employment structure in terms of economic activity. The percentage of people employed in the agriculture, forestry and fishing sector is higher in Eastern European countries. The highest employment rate in this sector, among the analysed countries, occurs in Poland. It amounts to as much as 8.7%. In Lithuania, this rate is also high - 5.8%. However, the downward trend of the indicator over the last ten years should be noted. In the remaining countries, this rate ranges only between 1% and 2%.

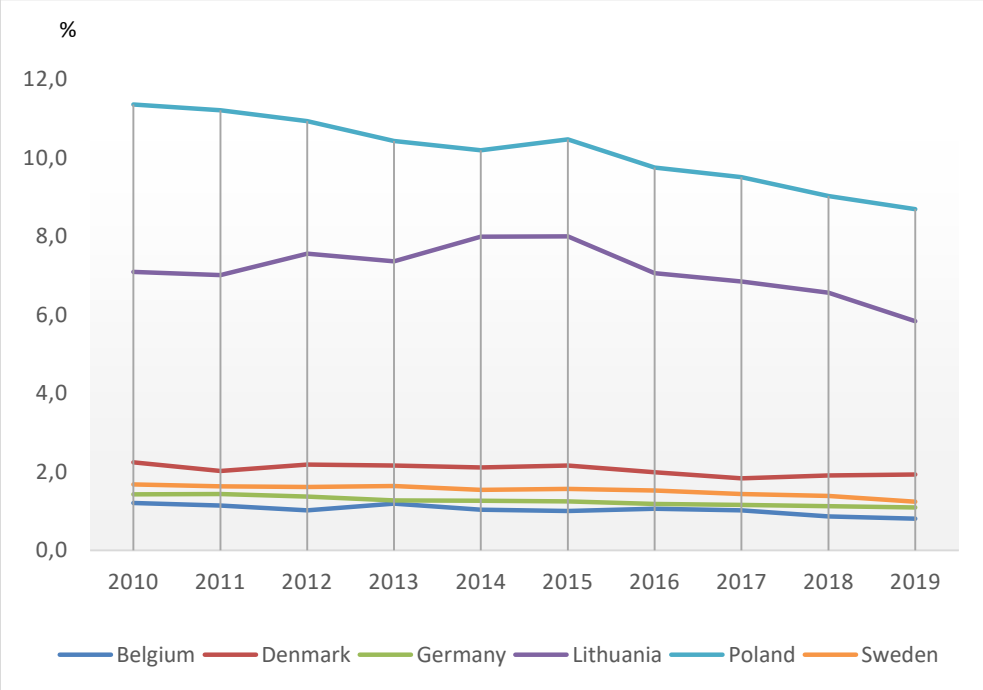

Figure 72. The employment rate in the agriculture, forestry and fishing sector (percentage of the active population)

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

The port workers of the EU are employed by a diversity of employers which makes it challenging to evaluate the number of port workers. Increasingly, port services are provided by private terminal operators holding a lease, concession, licence or authorisation issued by a landlord port authority. In most but not all ports, several terminal operators compete with one another. Some workers are still employed by public port authorities (especially, crane drivers, for example to a limited extent in Belgium, Denmark, Finland and France) or by commercial service providers controlled by a state-owned entity (Poland). Nevertheless, other port workers are self-employed; these workers are mostly united in professional

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associations, some of which at the same time act as employers of other workers.[30]

A characteristic feature of the Polish coast is the underdeveloped transhipment function in local seaports. The cargo turnover takes place only in Darłowo, Ustka and Elbląg. The remaining local ports mainly deal with fishing. In many of these local ports, particularly, the lesser ones, recreational fisheries (sea-angling) is becoming a more critical source of income than commercial fisheries.

In the West-Pomeranian region, the number of economic entities in the fisheries sector has been steadily decreasing in recent years. However, the catches equal or even exceed the ones recorded so far. In the region, 1.4% of entities were classified as maritime entities (over 3 000). Only in the Pomeranian region, this percentage is higher (2.4%). Almost 25 000 people are employed directly in the maritime economy in the West Pomeranian region, not counting further subcontractors.[31]

[30] Van Hooydonk, E. (2014). Port Labour in the EU. Labour Market, Qualifications & Training, Health & Safety, Volume 1-The EU Perspective.
[31] Development Strategy of the West Pomeranian Voivodeship until 2030 - project, Department of Strategic Management of the Marshal's Office of the West Pomeranian Voivodeship, Szczecin, April 2017.

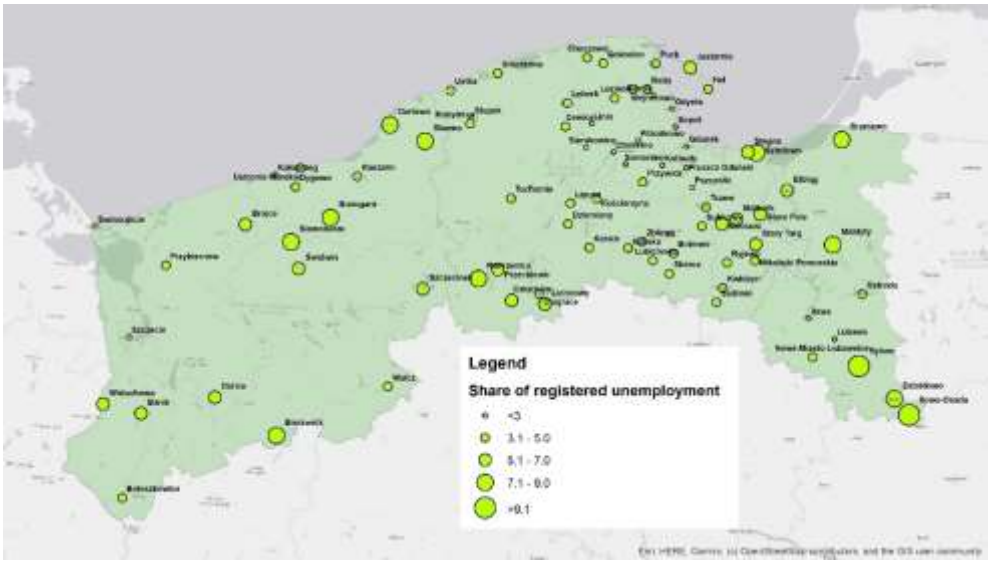

Figure 73. Share of registered unemployment in the working-age population in 2017

Source: Own elaboration based on Central Statistical Office data.

The largest share of the unemployed characterizes the peripheral areas of the Pomeranian and West Pomeranian region (southern part) and the entire studied area of the Warmian-Masurian region. Coastal areas are characterized by a relatively low share of the unemployed. In this group, the least favourable conditions occur in the Koszalin subregion, and more precisely in the area of Darłowo's influence.

Table 5.

Share of employment by sections in municipalities with small seaports

Unit	Agriculture, forestry, hunting and fishing			Industry and construction			Commerce			Financial activities			Other services		
	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017
	%														

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POMERANIAN	**11.0**	**10.6**	**10.2**	**29.2**	**29.4**	**29.4**	**22.7**	**23.2**	**23.0**	**4.7**	**4.5**	**4.2**	**32.4**	**32.2**	**33.2**
Puck Municipality	13.4	12.7	12.6	33.3	32.4	32.8	22.2	22.4	23.0	1.7	1.7	1.6	29.5	30.8	29.9
Slupsk Municipality	21.8	21.2	20.8	44.7	45.1	45.9	10.6	11.1	10.9	1.1	1.0	1.0	21.8	21.5	21.4
WEST-POMERANIAN	**12.9**	**12.5**	**12.1**	**28.0**	**28.2**	**28.2**	**21.8**	**22.2**	**23.4**	**3.4**	**3.3**	**3.0**	**34.0**	**33.7**	**33.3**
Kołobrzeg Municipality	10.9	10.3	10.3	22.3	21.5	21.7	30.8	32.6	31.7	2.4	2.3	2.1	33.6	33.3	34.2
Sławieński Municipality	28.8	28.4	28.2	28.7	28.8	27.9	14.7	15.7	16.0	1.7	1.7	1.7	26.1	25.4	26.3

Source: Own elaboration based on Central Statistical Office data

The fishing industry is diverse, but fluctuations in its production in recent years appear in all types of activities related to it. Each area also faces other problems, such as high costs of maintaining farming, maintaining good environmental status, poorly developed port infrastructure, and fishing quotas. It affects the condition of the fisheries sector, which is increasingly causing its entrepreneurs to think about diversifying their activities.

In the area of the Puck Bay, employment in fisheries is characterized by a lower share of young people (up to 30 years of age) than the average in Poland (8.8% to 13.5) and a larger proportion of older people (over 60 years) (13.1% to 8,9%). Sequentially, in 2007-2013, the number of people working in the processing and preservation of fish and fishery products both in the Puck Region and in the region remained at a similar level. Women (59.6%) still dominate among those working in processing. Current MIR estimates show that this area gathers 45.2% of employees on fishing vessels (at sea and on land) in the Pomeranian region and 1/4 of national employment. In 2014, most people were employed in Władysławowo (217, i.e. 41.0% of the total) and Jastarnia (208 people, i.e., 39.3%).[32]

[32] Development Strategy of the Puck Region for 2016-2025, Association North Kashubian Local Fisheries Group, April 2016.

Twenty fish processing plants operate in the area of the Słowińska Grupa Rybacka Fisheries, which includes the Ustka Port. Most of them have modern equipment and modernized or new infrastructure. MORPOL S.A., which is the largest fish and processing plant in Europe and the world, has the largest share in production and employment.

Twenty-three fishing farms are operating in the Darłowo Local Fisheries Group, within which the Darłowo port operates, some of which have many breeding and hatching centres scattered throughout the area, and 15 processing plants. Around 350 people are employed in the fisheries sector (excluding processing).

In the area of the Local Fisheries Group "Sea and Parsęta", in which Kołobrzeg operates, 321 people were employed in full-time fishing activities, including 250 at sea. Concerning data for the region, over 29% of those working on fishing were employed in the SRLGD area, while for nationwide data over 12.5%. According to the data contained in the RRW-1939 forms, in 2014, 237 people were employed in the municipalities belonging to SRLGD "Morze and Parsęta". The forms related to 44 units, i.e. 64.4% of the fleet registered in the municipalities of the City of Kołobrzeg, the municipality of Kołobrzeg and the municipality of Ustronie Morskie at the end of 2014. Almost 80% of people working on fishing in the SRLGD "Morze and Parsęta" area of activity were employed in fishing units. This result was lower than in most ports in Poland (87.3% on average).

In 2016, employment in the Kołobrzeg Municipality was 24 951 people, and in the port according to estimates by Piotr Nowaczyk (2016) around 1 085. It means that the port generated 4.3% of jobs in the Municipality. The volume of unemployment in the Kołobrzeg Municipality amounted to 1 878 people. Unemployment rate which accounted for 7%. In a hypothetical situation made by Piotr Nowaczyk assuming situation without the port, unemployment in the

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municipality would increase by the amount of employment generated by the port. It means that the unemployment rate would increase to 11.0%.[33]

The only operating port in Lithuania, Klaipeda, is a multipurpose, universal, deep-water port. The capacities of the Klaipeda port to handle cargo have substantially increased over the last decade, and since 2010 the port has been recording more than 30 million tonnes of annual throughput. In 2018 Klaipeda seaport cargo handling turnover increased to 46 million tonnes. That is why the total employment in the various port-related activities in Klaipeda is estimated on 2 730 people. According to Port Authorities, the port created over 85 thousand workplaces and accounted for 6.13 per cent of the total GDP of Lithuania.[34]

The five biggest stevedoring companies are respectively Klasco, Klaipedos Nafta. Bega Klaipeda Stevedoring, Klaipedos Smelte and Klaipedos Terminals. There are also some 99 shipping agencies active in the port and numerous forwarding companies. Klaipeda Free Economic Zone has been operational since 2002 and connects over 5 400 employees (5.4% of Klaipeda's working population) who work at more than 100 industrial businesses. Maritime works and other maritime services are scattered along the main maritime branches, located in and outside of the port area. There were seven companies distinguished involved in marine projects, with the largest as Hidrostatyba and Klaipedos hidrotechnika. There are several companies, institutions and authorities related to the maritime economy. It is a labour-intensive branch comprises classifications and inspections institutions, Klaipeda Customs Office, Maritime Safety Administration and auxiliary service like bunkering and crewing.[35]

[33] Nowaczyk, P. (2016). Próba określenia znaczenia portu morskiego w Kołobrzegu dla lokalnego rynku pracy. Studia Ekonomiczne, 286, 107-119.
[34] Klaipeda Port, www.portofklaipeda.lt/the-port-of-klaipeda, accessed on 21.04.2020.
[35] An exhaustive analysis of employment trends in all sectors related to sea or using sea resources. Country report Lithuania. Ecotec Research and Consulting together with Dagne Eitutyte, August 2006.

Denmark has some 120 commercial seaports which include a lot of small local ports. For the greater part, port authorities are publicly owned, and cargo is handled by private port operating companies. With many ports and many port operating companies, the Danish port system sees a high degree of competition.[36]

The Danish labour force is generally highly skilled and flexible. The specific labour system, however, varies widely from port to port, depending on local agreements and whether the various employers have permanently employed terminal workers or labour supplied only by a pool of dock workers.[37]

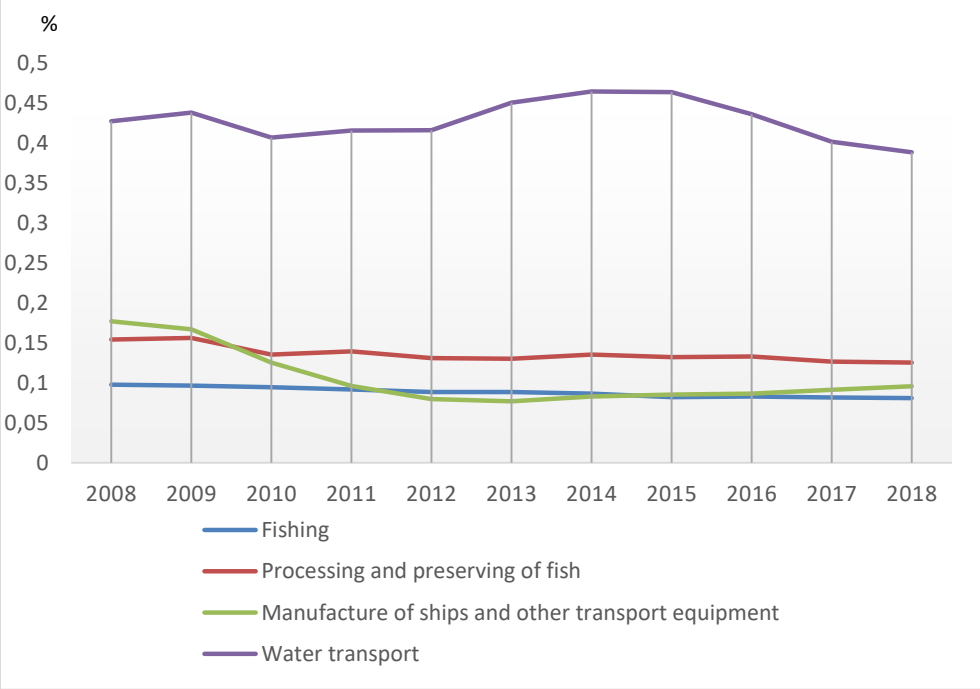

Figure 74. The employment rate in Denmark by industry sector

[36] DI Confederation of Danish Industry DK-1787 København V http://www.dkhv.dk/ufdkhv/File/A%20short%20description%20of%20the%20Danish%20port%20labour%20system.pdf

[37] A short description of the Danish port labour system, Danish Port Operators, Copenhagen, 2014.

Source: Statistics Denmark, www.statbank.dk, accessed 23.04.2020.

As can be seen in the above chart, employment in the sectors related to the broadly defined maritime economy is low in the country. Most people are employed in the sector related to water transport. However, their share fell below 0.4% in 2018. A decrease in the number of people employed in the manufacture of ships and other transport equipment sector due to the economic crisis of 2007-2009 is also noticeable.

Germany has the fourth-largest national economy and industrial base in the world. The overwhelming majority of German businesses are small and medium-sized enterprises. A total of 61% of the workforce in Germany works in these small and medium-sized enterprises. In 2016, Germany was the world's third-largest export nation, behind the United States and China.[38] For this reason, there are many transport companies in the country. Seaports also play a significant role. However, it should be noted that local ports, however, employ a small number of employees. The impact of local seaports on the German labour market is small.

It should also not be forgotten that the coastal location and the associated landscape values are conducive to the development of tourism. Leisure tourism is the most popular form of tourism in the studied area, which results directly from the coastal location. For climatic reasons, this type of tourism is almost exclusively limited to the summer season, and it also depends largely on current weather conditions. Active tourism, especially water tourism, is also prevalent. The regions offer conditions for lovers of sailing, windsurfing or kitesurfing. Tourism generates many jobs, both in accommodation facilities, gastronomy and recreational and entertainment facilities. Besides, tourists are spending their holidays around local

[38] European Commission, The European Job Mobility Portal, ec.europa.eu/eures/main.jsp?catId=2641&countryId=DE&acro=lmi&lang=en, accessed on 23.04.2020.

ports, thus enjoy the services of everyday life (hairdressers, beauty and SPA, car mechanics, doctors). It is a circumstance that may be an additional opportunity for non-tourism industries.

According to the conducted investigation, there is no significant impact of any of the analysed South Baltic local ports neither on the local nor regional labour market. Any of the South Baltic local ports are by no means essential actors on the regional or, even more, on the local labour market.

Two examples can be presented as best illustrations for the above argument. With the transformation, the port of Vordingborg is evolving into one of the largest commercial seaports on the southeast Danish islands of Zealand, Falster, Lolland and Møn. The expansion was significant for both the port, the town, and the Vordingborg Municipality. However, the resulting social effect of the project was estimated to reach just 234 full-time equivalents with private investments providing up to 909 local and regional jobs. It is less than 1% of the labour force in two neighbouring municipalities of Vordingborg and Gulborgsund.

The situation in Darłowo, a local port-town in West Pomeranian region of Poland is quite different, however, with a similar result for the local labour market. The town is in north-western Poland, on the Baltic seacoast in the coastal region of Koszalin. It was a historical Hanseatic seaport-town and still is a traditional convalescence spa-town along with the adjacent seaside resort of Darłówko. It is the largest town in Sławno County (population 14 000). Remarkably, the number of inhabitants and that of jobless people in Darłowo was very stable throughout the 2000s exceeding 40% of the total population. It means that out of 9 000 people of working age, 4 000 were unemployed at any given time regardless of any ups and downs experienced by the port of Darłowo during the same period.

Both examples of Vordingborg and Darłowo are substantial in providing the proof that any of the local ports are by no means essential actors on the regional or,

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even more, on the local labour market. Ports indeed generate business, jobs and growth. However, the port's administrative staffs are generally minimal. A typical local port has seven to twenty employees. It means that there is a need for subcontracted services in, for example, law, environment, economics and communication that can support the port's operating organizations. On the other hand, the port area could and should serve as a convenient location for enterprises, particularly innovative and competitive ones.

4.4. Strengthening of fishery

All the countries around the Baltic Sea, except the Russian Federation, are members of the European Union and have their fishing activities regulated by the EU Common Fisheries Policy. In 2009, the European Union and the Russian Federation reached a bilateral agreement governing fisheries in the Baltic Sea. Specific to the Baltic Sea region is a strong tradition of cooperation through various vital organisations involved in the management of Baltic Sea fisheries. These include the Baltic Sea Advisory Council (BSAC), Baltic Marine Environment Protection Commission (HELCOM), and the International Council for the Exploration of the Sea (ICES). Sustainable development in the region is being promoted by the European Union Strategy for the Baltic Sea Region, approved by the Council of the European Union in October 2009.[39] The strategy led to the establishment of the cooperation forum BALTFISH intending to strengthen cooperation of fisheries administrations, as well as various stakeholders relevant for the Baltic Sea fisheries.[40]

[39] Baltic Sea Region - mfa.gov.lv. https://www.mfa.gov.lv/en/policy/baltic-sea-region
[40] Fisheries and aquaculture around the Baltic Sea, Eurofish, 2015.

Baltic fisheries are experiencing difficulties related to the introduction by the European Union of fishing quotas for sea fish and periodic restrictions on fishing for certain species of fish. In 2017, 137.7 thousand tonnes of fish and marine invertebrates were caught from Baltic fisheries (66.1% of total catch weight). It is a decrease of 0.8% compared to the previous year. It resulted mainly from the very low utilization of the cod quota. Cod catches decreased by almost 30% compared to 2016 to just 7.32 thousand tonnes, with an amount of 12.06 thousand tonnes. Currently, the cod fishing limits are so low (18 000 tonnes in 2015, 13 000 tonnes in 2016) that 'one vessel serves two limits'. The limits for sprat catches are also meagre, i.e. around 66 000 tonnes in 2015, 59 400 tonnes in 2016, and herring only 47 300 tonnes in 2016.[41]

A significant decrease in catches was also recorded for flatfish (-27% to 11.02 thousand tonnes). Herring catches remained at the previous year's level (43.53 thousand tonnes), while sprat landings increased by 16.3% to 69.86 thousand tonnes. The value of Baltic catches calculated in the prices of the first sale of fish amounted to PLN 203.8 million (9.2% less than the year before).[42]

[41] Sala, J., Tańska, H. (2018). Wybrane inicjatywy wspierające rozwój i ich koszty na przykładzie regionów gospodarki morskiej. Nierówności społeczne a wzrost gospodarczy, 53, 275-285.
[42] Polish Maritime Economy in 2017 r., Central Statistical Office, 2018.

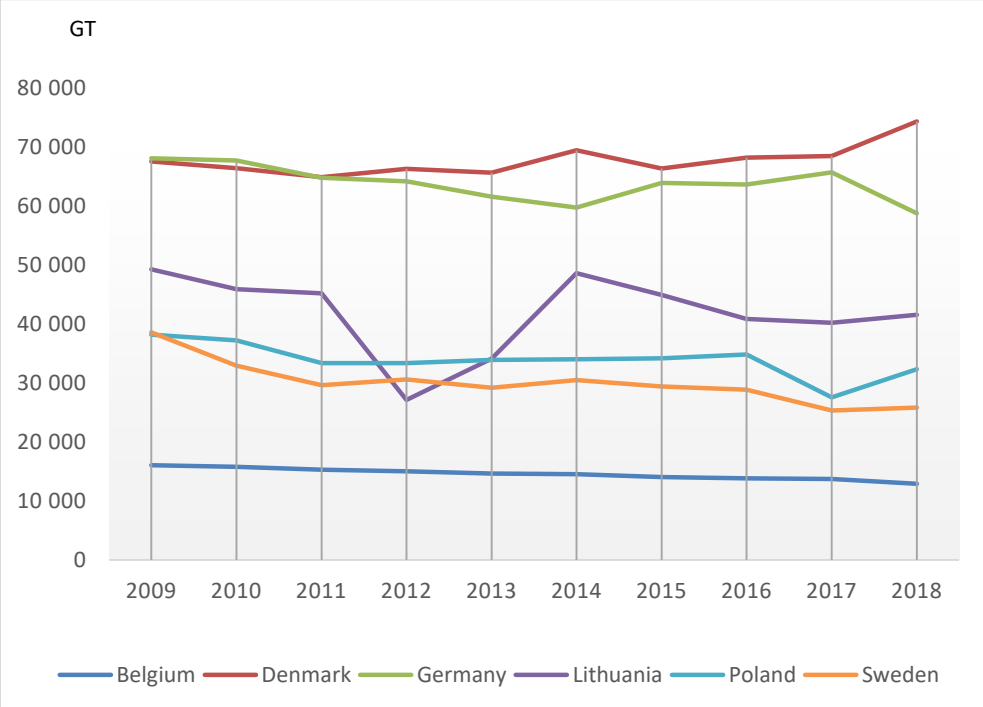

Figure 75. Fishing fleet in terms of gross tonnage

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

In 2017, the Polish fishing fleet had 834 vessels (1.1% less than in the previous year) with total gross tonnage GT of 27.6 thousand (21.0% less than in 2016) and the total capacity is 76.3 thousand kW (8.3% less than in the previous year). The Polish fishing fleet consisted of 3 trawlers, 124 cutters and 707 boats. Gdynia remained motherhood port for all trawlers. 75.0% of cutters stationed in the Pomeranian region, while the others were in the West Pomeranian region. Fishing boats were stationed in all coastal regions: Pomorskie (47.6%), West Pomeranian (43.1%) and Warmian-Masurian (9.3% of the total number of Polish fishing boats).

Many factors are affecting the decreasing role of fishing in Polish seaports. Numerous sectoral discussions and regional publications in the field of fisheries

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emphasize that the Polish fishing fleet is increasingly used for fishing for feed, not for consumption. Unfortunately, fish caught by Polish cutters constitute less and less commercially available fish. Only 16% of fish processed in Poland in 2015 for consumption came from native fishers.[43]

Table 6.

Limits and prices of salmon catch

Salmon catch	1980-	2016
Limit for catches for one cutter	700 pcs.	106 pcs
Limit for fishing for Polish fishermen	80 000 pcs.	6 060 pcs.
Price per kilo from the cutter	14 PLN (2006)	28-30 PLN

Source: Sala, J., Tańska, H. (2018). Wybrane inicjatywy wspierające rozwój i ich koszty na przykładzie regionów gospodarki morskiej. Nierówności społeczne a wzrost gospodarczy, 53, 275-285 za Goździewska K., 2016, Rybacy w porcie, a ryby z importu. Kto ograbił Bałtyk, Nasz Magazyn, „Nasz Dziennik" nr 141.

The annual turnover from cod fishing does not guarantee profitability, as the operating costs of the cutter are high (crew salary, fuel). Therefore, according to the Institute of Agricultural and Food Economics, in 2014 Poland had only 2 600 fishermen, including 210 deep-sea fishers. The Polish fleet of cutters and boats significantly decreased (Table 7).

Table 7.

The cutter fleet of small seaports in Poland in the years 2014-2017

PORTS	2014		2015		2016		2017	
	number of cutters	average age	number of cutters	average age	number of cutters	average age	number of cutters	average age
TOTAL	**153**	**41.4**	**153**	**42.4**	**134**	**42.5**	**130**	**42.9**
Darłowo	13	52.2	13	53.2	6	49.5	4	46.3

[43] Sala, J., Tańska, H. (2018). Wybrane inicjatywy wspierające rozwój i ich koszty na przykładzie regionów gospodarki morskiej. Nierówności społeczne a wzrost gospodarczy, 53, 275-285.

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Hel	8	39.4	8	40.4	9	40.9	9	41.9
Jastarnia	15	54.5	15	55.5	13	55.7	13	56.7
Kołobrzeg	41	23.5	41	24.5	38	26.0	34	28.2
Ustka	33	41.2	33	42.2	26	43.0	26	43.7
Władysławowo	43	37.7	43	38.7	42	39.7	44	40.8

Source: Maritime economy. Statistical review 2018, Maritime Institute in Gdańsk, 2018.

There is talk of the need for "revitalization" of fishing in the Baltic Sea and the hope for the revival of Polish deep-sea fishing. The data on high exports of fish processing plants located in Poland are deceptive, as they are products made from imported fish, not caught by Polish cutters. According to W. Wawrzyniak from the Department of Fisheries Economy of the West Pomeranian University of Technology in Szczecin, populations of commercial fish in the Baltic Sea need a revival. Feed catches must be stopped because the Baltic Sea is too small for large 30-40-metre vessels (mainly Danish and Swedish) that catch almost everything devastating trophic nets (food dependency network) in the sea. Before 2004, the Polish Economic Zone was one of the most productive zones in the Baltic. Unfortunately, the EU Fisheries Development Strategy for 2007–2013 had a significant impact on the significant deterioration of the situation, including through quotas and the opening of catches by fishing vessels of all Baltic States (except Russia).[44]

It should be assumed that the conducted fisheries ensure and will continue to ensure full exploitation of natural resources. These catches may fluctuate in individual years, and quite significantly depending on the size of the hunting population of exploited stocks. However, given the current state of the environment

[44] Sala, J., Tańska, H. (2018). Wybrane inicjatywy wspierające rozwój i ich koszty na przykładzie regionów gospodarki morskiej. Nierówności społeczne a wzrost gospodarczy, 53, 275-285.

and the availability of fisheries, the supply of fish from Polish fishing will probably not exceed 200 000 tonnes.

It is also worth remembering that fishing restrictions do not apply to the three-mile coastal waters zone, so practically boat fishers. Therefore, small-scale fishing can be a kind of tourist attraction in small ports and harbours, just like it has a place in many small ports in Spain, Portugal, France or Finland. There is a sale of fresh fish straight from the boat, preliminary processing and sale of culinary delicacies in numerous small gastronomy products.

Furthermore, there is a necessity to secure the interests of fisheries in the offshore wind energy development scenario. The opportunity, in this case, is the use of turbines foundation areas for development of mariculture (e.g. rearing mussels for the nutrients reduction). Unfortunately, the strategic and primary objectives for the development of aquaculture included in Annex 6 of the Operational Program „Rybactwo i Morze" (PO RYBY 2014-2020), i.e. the strategic plan for the development of fish farming and breeding in Poland in 2014-2020 are based on the development of Polish inland aquaculture. Aquaculture in Poland is not associated in any way with the activities of seaports. Local ports cannot count on economic growth associated with fish or other marine organisms, such as mussels.[45]

Denmark is facing similar fishing problems. There is a large number of harbours that do not have enough incomes to cover coasts, which is why a large number of harbours have been closed down in recent years, meaning that there are no commercially caught fish being landed there anymore and the only purpose of the harbours is to store yachts and recreational boats. The figure below (Figure 76) shows where the commercial harbours in Denmark are located and how much share in the total landings they have:

[45] Operational Program „Rybactwo i Morze" (PO RYBY 2014-2020) Department of Fisheries, Ministry of Agriculture and Rural Development, Warsaw 2014.

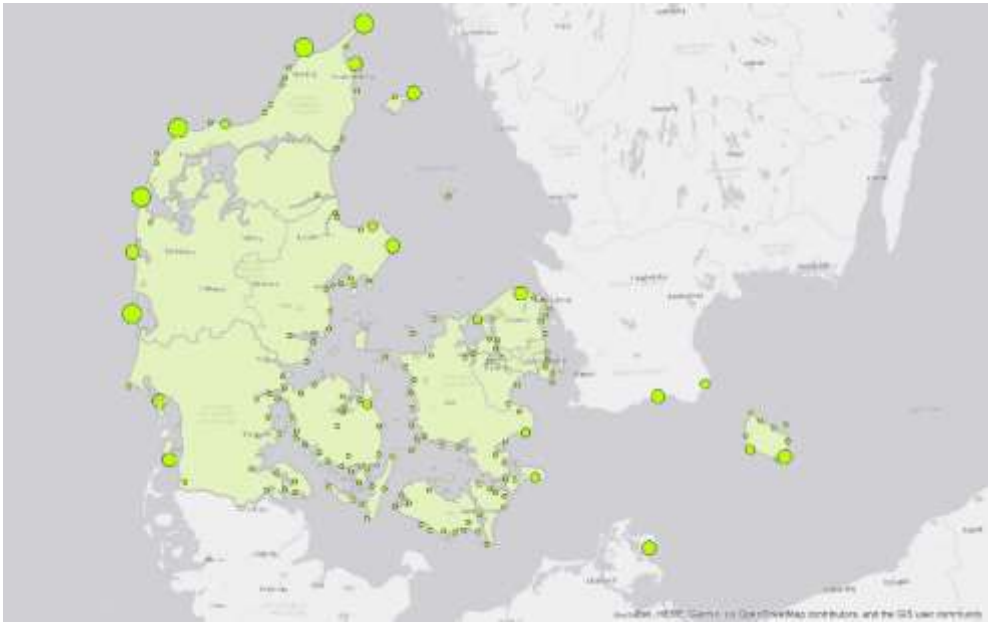

Figure 76. Harbours with commercial landings in Denmark.

Source: Viðarsson, J. R., Einarsson, M. I., Ragnarsson, S. Ö., Laksá, U., Danielsen, R., Iversen, A., ... & Decker, D. (2018). Nordic coastal fisheries and communities: Status and prospects. Nordic Council of Ministers.

The number of vessels in the coastal sector has decreased significantly since the turn of the century – by 60% since 2000. Coastal vessels use gillnets, bottom trawls and pelagic trawls as fishing gear primarily. There are almost 1 200 full-time fishermen in the Danish fishing fleet, of which 44% are working on vessels under 18 metres ad 18% working within the coastal fishing system.

Table 8.

Danish vessels by type and tonnage

Type of vessel	2008		2013		2018	
	Number of vessels	Gross tonnage	Number of vessels	Gross tonnage	Number of vessels	Gross tonnage
Vessels total	2 888	73 024	2 662	65 386	2 135	72 042

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Trawlers	384	48 546	288	45 216	238	51 145
Purse seiners and multi-purpose vessels	234	12 184	285	10 020	260	12 866
Danish seiners	37	2 008	27	1 413	16	1 010
Liners and Gill netters	870	6 885	829	5 506	709	4 250
Other vessels	1 363	3 400	1 233	3 232	912	2 771

Source: Statistics Denmark, www.statbank.dk, accessed on 02 Jul. 19.

The total landings of the Danish fleet in 2015 amounted 920 thousand tonnes, valued at EUR 477 million. The coastal fleet, i.e. vessels below 18 metres, accounted for 8% of the catch volume (77 thousand tonnes) and 20% of the value (EUR 94 million).

Atlantic cod is the most important species, representing 23% of the value, followed by crustaceans, molluscs, Nephrops and plaice. Almost half of the catches are industrial fish, which are not going for human consumption.

Numerous research studies have shown that the Danish coastal fleet is struggling because of low income and negative returns. As a result, there has been low recruitment among coastal fishers because young people do not see any future in entering the sector.

Some coastal fisheries businesses are also competing with other industries for space in the harbour, either for industrial purposes or just for housing, as real estate prices for residential housing in harbour areas have been rising. It is highly likely that this trend of reducing coastal sector will continue, as consolidation will increase where small coastal boats are bought up by large companies.

Coastal fisheries and coastal fishers in Denmark generally have a positive image, but it is a tiny sector that has limited impact on regional development or employment on a national scale. The total population of Denmark is around 5.7 million and the labour market is around 2.8 million, of which coastal fishers

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accounts for 0.02%. Coastal fishers are, therefore, a small lobby group that struggles to have its voice heard. The importance of the sector for regional development is also marginal, for the same reasons. The traditional fishing villages do not depend as much on the coastal sector as before, and most of the inhabitants are currently working in sectors that have little or nothing to do with fisheries.[46]

There are almost 1 200 vessels in the Swedish fishing fleet today, as they reduced in number by more than 30% since the year 2000. 1 014 (87%) of them can be defined as coastal vessels. Majority of these are however recreational vessels under 8 metres, so the commercial coastal fleet does therefore only include about 400 vessels.

Table 9.

Number of fishing vessels by county and length in 2018

County	0 - 11,99 metres	>12 metres	Total
Blekinge Län	92	7	99
Gotlands Län	23	6	29
Gävleborgs Län	55	2	57
Hallands Län	47	19	66
Kalmar Län	93	4	97
Norrbottens Län	112	14	126
Skåne Län	126	9	135
Stockholms Län	30	2	32
Södermanlands Län	11	0	11
Uppsala Län	27	2	29
Västerbottens Län	41	0	41

[46] Viðarsson, J. R., Einarsson, M. I., Ragnarsson, S. Ö., Laksá, U., Danielsen, R., Iversen, A., ... & Decker, D. (2018). Nordic coastal fisheries and communities: Status and prospects. Nordic Council of Ministers.

County	0 - 11,99 metres	>12 metres	Total
Västernorrlands Län	32	0	32
Västra Götalands Län	303	83	386
Östergötlands Län	22	0	22
Total	**1 014**	**148**	**1 162**

Source: Swedish sea-fisheries during 2018. Definitive data.

Swedish fishers have also significantly reduced in numbers, as commercial fishers have been reduced by more than 1/3 in the last 20 years; and the number of coastal fishers has declined even more. The main fishing grounds for the coastal sector are in the Baltic Sea, Skagerrak and Kattegat, where the most important stocks have been struggling in recent years.

The number of fishers in Sweden has declined over the past few decades. In 2013 there were only 1 464 licenced fishermen in Sweden, of which 65% were over 50 years old. The trend has continued, and in 2015 the number of licenced fishers has reduced even more. Fishers in the east of Sweden, fishing in the Baltic Sea, which has traditionally been well presented by the coastal fleet, has reduced by over 50%.

The total catches of the Swedish fleet are around 200 thousand tonnes a year, of which less than 5 thousand tonnes (2%) are coming from the coastal fleet. The catches of the coastal fleet have decreased by almost 50% in the past 20 years, going from 8 500 tonnes down to 4 500 tonnes. The most important species are cod, herring, Nephrops and salmon, which account for 80% of the catches.

The mainstay of the catches of the Swedish fleet consists of pelagic species such as herring, sprat and sand eel that are almost solely caught by large purse seiners. These three species accounted for 90% of the total catches in 2016 and 45% of the landing value. The total landing value of the Swedish fleet has been

relatively stable over the past two decades, fluctuating between SEK 900-1,200 million. In 2016 the total landing value was just about SEK 1 billion years (EUR 100 million). The total landing value of the coastal fleet is though only marginal within the total landings value of the Swedish sector.

The coastal sector has traditionally been important in some coastal communities, particularly in the East coast of Sweden. It has however changed a lot in recent decades, and the sector has today relatively little impact on the smaller communities.

Some coastal fisheries businesses in Sweden are now having to compete with other industries for space in the harbours, either for industrial purposes or just for housing, as real estate prices for residential housing in harbour areas has been rising. The coastal fleet has therefore almost been completely pushed out of some harbours in Sweden.

The coastal fleet in Sweden today consist of relatively few vessels, and the number of coastal fishers is also decreasing. There is little renewal amongst the fishermen, so the ones still in operation are majorly over the age of 50. The value of the landings is low, and the impact on communities is decreasing. The importance of the coastal fleet for regional development is therefore not nearly as significant as 20-30 years ago.[47]

During the last decade, the number of vessels of the German fleet has decreased from 2 315 in 2000 to 1 492 in 2014. It is a total decline of about 36% over 15 years. The German fleet of 1 492 vessels, representing only 1.7% of the European Community fleet in terms of vessel numbers. Nearly 80% of the fleet are small vessels (<12 metres in length). Most of the other vessels are trawlers fishing

[47] Viðarsson, J. R., Einarsson, M. I., Ragnarsson, S. Ö., Laksá, U., Danielsen, R., Iversen, A., ... & Decker, D. (2018). Nordic coastal fisheries and communities: Status and prospects. Nordic Council of Ministers.

for demersal and pelagic species and flatfish in the North Sea and the Baltic. Only 17 vessels over 12 metres length are using passive gear as the main gear.[48]

German fishery mainly operates in the North Sea (Crangon shrimp, mussels, saithe, flatfish and many others), the Baltic Sea (herring, cod, flounder, sprat) and on long distant waters, North Atlantic, NAFO, Greenland, Norway and Mauritania (herring, mackerel, blue whiting, horse mackerel, sardine, Greenland halibut, Sebastes redfish, saithe, cod).

Total fisheries production amounted to 255 200 tonnes (live weight) in 2013. Capture fisheries produced 229 900 tonnes and aquaculture 25 300 tonnes in 2013. Aquaculture production is considerably underestimated because the new data collection system in Germany no longer covers the production by small producers that are quite substantive. In 2014, imports of fish and fishery products were valued at USD 5.9 billion and exports were worth USD 3.0 billion.[49]

In 2014, about 2 270 people were reported directly engaged in marine fishing, and an additional 6 600 were employed in the processing industry. Germany maintains an important fish processing industry which is greatly dependent on foreign sources of raw material supply.[50]

The Lithuanian territorial waters and maritime exclusive economic zone comprise 7 000 km^2, which is about two per cent of the Baltic Sea. Other water bodies with commercial fisheries significance consist of for example the Lithuanian part of the Curonian lagoon (41 300 ha out of the total area of 161 000 ha).[51] Fisheries in Lithuania have a long tradition and plays an important role in small communities in coastal areas. The sector employs 6 037 full-time workers:

[48] Food and Agricultural Organization of the United Nations, www.fao.org/fishery/facp/DEU/en, accessed on 21.04.2020
[49] Policy Department B: Structural and Cohesion Policies. Fisheries in Germany. Directorate-general for Internal Policies, European Parliament, 2014.
[50] Food and Agricultural Organization of the United Nations, www.fao.org/fishery/facp/DEU/en, accessed on 21.04.2020
[51] Ibidem

565 in fisheries, 431 in aquaculture, and 5 041 in fish processing. About two-thirds of the employees are women who are traditionally employed in the fish processing industry.[52]

The Lithuanian fleet is divided into three segments: small-scale operating in the Baltic Sea coastal area, large-scale operating in the Baltic Sea, and the long-distance fleet that is the largest in terms of capacity and economic size.[53]

Marine fisheries represent most of the total Lithuanian catch. According to Eurostat[54], total capture by marine fisheries in 2018 was 70 196 tonnes, which included the Baltic Sea, long-distance ocean and coastal fisheries. Lithuania's fishing fleet numbered 147 vessels in 2018, most being small coastal fishing vessels under 12 metres long (106), while only 31 fishing vessels operate in the open Baltic Sea. Lithuania has ten long-distance fishing vessels which operate in areas regulated by North West Atlantic Fisheries Organization (NAFO), the North-East Atlantic Fisheries Commission (NEAFC) and South Pacific Regional Fisheries Management Organization (SPRFMO).

The Baltic Sea marine fishery that also includes the coastal fishery captured 24 748 tonnes of fish. The four main commercial species are cod, herring, sprat and plaice. Although Baltic sprat contributes two-thirds of the catch, cod (775 tonnes) is important due to its high value. Catches of herring were 6 676 tonnes and 365 tonnes of flounder. Nearly all the fish landed is used for human consumption.

The operating high-seas fishing fleet contributes the largest share in volume and value to total Lithuanian catches. Approximately 64% of all 2018 total catches are from this segment. The value of this segment is 90% of the total. Targeted species in both the Mauritanian and Moroccan exclusive economic zone are the

[52] Lithuania - Eurofish.dk. https://www.eurofish.dk/index.php/lithuania
[53] Ibidem
[54] Eurostat, appsso.eurostat.ec.europa.eu.

Atlantic horse mackerel and chub mackerel. Vessels also operate in the Pacific Ocean.[55]

4.5. Potential of blue and green technologies in the local seaports

This chapter aims to present the blue and green technologies used in local ports in the analysed area, as well as the possibility of their implementation in ports that do not operate under blue or green assumptions.

The first thing that is necessary for the analyses is to define blue and green growth. The green growth is a term to describe a path of economic growth that sustainably utilises natural resources. It implies fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which the well-being of the current and future generations rely. In line with policy and research definitions, the South Baltic Programme encompasses the following sectors of the green economy: [56]

- renewable energy and efficient use of electricity,
- green construction,
- clean transportation,
- environmental management,
- agriculture, forestry and land management,
- food manufacturing and processing,
- sustainable (green/eco) tourism.

[55] Eurofish International Organisation, www.eurofish.dk, accessed on 21.04.2020.
[56] Interreg South Baltic webpage, southbaltic.eu/-/blue-and-green-growth-explained, accessed on 17.04.2020.

Blue growth, however, is part of the Europe 2020 strategy and addresses the economic potential of the oceans, seas and coasts for sustainable growth and jobs, to be developed in harmony with the marine environment and through cooperation between public and private partners, including SMEs. In concordance with the European Commission's Communication on *Blue Growth – Opportunities for Marine and Maritime Sustainable Growth*[57], the term "blue economy" can be related to the following sectors:[58]

- Blue energy – offshore wind power, tidal and wave power, ocean thermal energy conversion,
- Aquaculture,
- Maritime, coastal and cruise tourism,
- Deep-sea and short-sea shipping,
- Marine mineral resources (seabed mining),
- Marine biotechnology (e.g. resources in the pharmaceutical and cosmetic industries),
- Desalination,
- Coastal protection,
- Maritime security & surveillance and environmental monitoring,
- Maritime spatial planning for combined uses of maritime resources.

Managing the life cycle of natural resources, from extraction through the design and manufacture of products, to what is considered as waste is essential to

[57] Blue Growth – Opportunities for marine and maritime sustainable growth – Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions, Luxembourg: Publications Office of the European Union, 2012

[58] Interreg South Baltic webpage, southbaltic.eu/-/blue-and-green-growth-explained, accessed on 17.04.2020.

green growth and part of developing a resource-efficient, circular economy where nothing is wasted.[59]

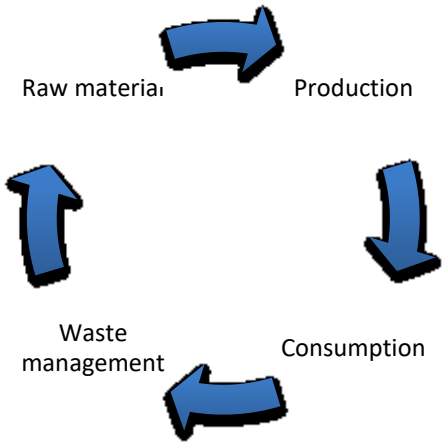

Figure 77. Green growth and circular economy.

Source: own elaboration based on European Commission webpage, ec.europa.eu/environment/green-growth/index_en.htm, accessed on 17.04.2020.

Blue and green growth may have a significant impact on the development of local ports in the South Baltic region. However, it is difficult to determine the impact of each of the sectors of the blue and green economy for each local port. Most of them will never can benefit from the development of this type of economy due to their location and functionality. The sectors that can affect selected local ports are:

- aquaculture,
- coastal and sea tourism,
- renewable energy,

[59] Green growth and circular economy - Environment - European .... http://ec.europa.eu/environment/green-growth/index_en.htm

- blue biotechnology.

Besides, local seaports can be the perfect headquarters for many companies involved in research into blue growth in the Baltic Sea. Their location and existing infrastructure can create the right conditions for the work of highly qualified employees in these sectors of the economy.

Aquaculture

Aquaculture is the cultivation of aquatic animals and plants in natural or controlled marine or freshwater environments, whereas mariculture is restricted to marine and estuarine (brackish) waters[60]. Freshwater aquaculture production is more developed than marine aquaculture. In the Baltic Sea region, Poland and Denmark are the largest producing countries, followed by Germany, Sweden, and Finland. Marine production is relatively low. Denmark and Finland are the region's major marine producers. Shellfish production is led by Germany and followed by Sweden and Denmark.[61]

[60] Mmochi, A. (2016). Mariculture. Western Indian Ocean, 20(10), 289.
[61] Fisheries and aquaculture around the Baltic Sea, Eurofish, 2015.

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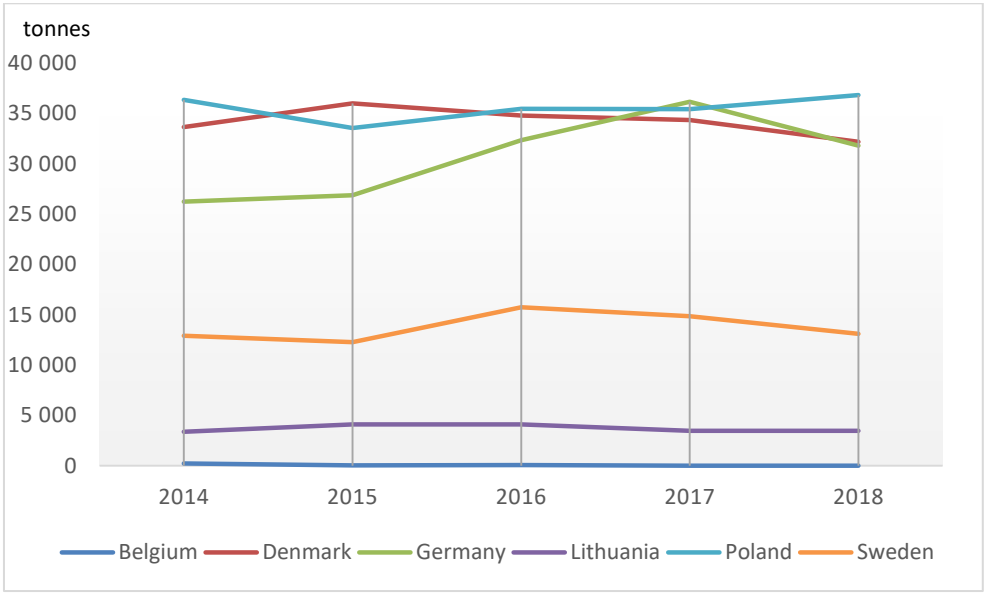

Figure 78. Production from aquaculture excluding hatcheries and nurseries (tonnes live weight)

Source: own elaboration based on Eurostat, appsso.eurostat.ec.europa.eu.

Mariculture, however, is the fastest-growing food sector in the world. Global aquaculture production (including aquatic plants) in 2016 was 110.2 million tonnes, with the first-sale value estimated at USD 243.5 billion.[62]

Mariculture in the world is one of the main branches of aquaculture. Includes rearing and breeding of virtually all groups of aquatic organisms that can provide any food or industrial value. Unfortunately, the conditions that characterize the Baltic Sea do not favour the development of most known breeding technologies used in mariculture. It is influenced by the following conditions and factors:

- low salinity of sea waters, which in practice eliminates the possibility of efficient breeding of crustaceans and molluscs for consumption (based on

[62] Imelda J., Asha A., Genomics and Biotechnological Advances in Veterinary, Poultry, and Fisheries, 2020.

an experiment that requires further research, the possibility of breeding one crustacean – signal crayfish) is being considered,

- too large depths (below 30 m) prevailing in most of the Polish Baltic area and too low water temperatures (rarely exceeding 20 degrees) do not favour the development of most known technologies for the cultivation of marine organisms.

Denmark is one of the world's largest traders of fish and seafood. The Danish aquaculture industry produces mainly rainbow trout, which makes up approximately 90% of total production, followed by European eel and blue mussel. Since 2008, Danish marine aquaculture production volume has increased sevenfold. Danish aquaculture is strictly regulated by environmental rules.

Table 10.

Aquaculture in Denmark by farm types

Farm type	2015	2016	2017
	t	*t*	*t*
All fish farms	46 890	45 619	48 300
Traditional trout farms	15 118	14 351	14 934
Trout farms with re-circulation, type 1	3 836	3 747	4 293
Trout farms with re-circulation, type 3	9 373	8 996	8 769
Sea farms	11 724	10 117	11 427
Shellfish farms, mussels	1 809	2 251	2 814
Other farms	5 029	6 158	6 063

Source: Statistics Denmark, www.statbank.dk, accessed on 02 Jul. 19.

Offshore wind farms are widely spread in Denmark. However, their growth has proven to limit the allowable space for aquaculture sites. Therefore, the environmental authorities, to enhance sustainability, improve marine space

utilization and reduce costs, are encouraging to move the aquaculture facilities between the wind farms.[63]

Although German fish consumption is not high, Germany has one of the largest fish-processing industries in Europe, dominated by large companies, and is one of the largest markets for fish and seafood in Europe. Most seafood is imported, with Alaska pollock, salmon, herring, tuna, and trout as the most important species, causing an increasingly negative trade balance. Aquaculture is carried out mostly in southern Germany. Rainbow trout, common carp, and blue mussel are the principal species.

In total, 21 species of seaweed, bivalves, fish, and crustaceans were identified as adequate aquaculture candidates accounting for their natural occurrence in the German North Sea, their resistance to hydrodynamic conditions in offshore environments as well as their economic potential for the EU market.[64]

Table 11.

Aquaculture businesses in Germany

Types of installation	Aqua-culture businesses	Size of installa-tion	Aqua-culture businesses	Size of installa-tion	Aqua-culture businesses	Size of installa-tion
	number	*jew. ME*	*number*	*jew. ME*	*number*	*jew. ME*
	2011		2014		2017	
Mecklenburg-Vorpommern						
Ponds (ha)	9	1 032	11	1 033	9	1 009
Tanks/raceways/trout ponds (m^3)	9	14 643	5	22 392	6	22 868

[63] Di Tullio, G. R., Mariani, P., Benassai, G., Di Luccio, D., & Grieco, L. (2018). Sustainable use of marine resources through offshore wind and mussel farm co-location. Ecological Modelling, 367, 34-41.

[64] Gimpel, A., Stelzenmüller, V., Grote, B., Buck, B. H., Floeter, J., Núñez-Riboni, I., ... & Temming, A. (2015). A GIS modelling framework to evaluate marine spatial planning scenarios: Co-location of offshore wind farms and aquaculture in the German EEZ. Marine Policy, 55, 102-115.

Types of installation	Aqua-culture businesses	Size of installa-tion	Aqua-culture businesses	Size of installa-tion	Aqua-culture businesses	Size of installa-tion
	number	*jew. ME*	*number*	*jew. ME*	*number*	*jew. ME*
	2011		2014		2017	
Recirculation systems (m^2)	8	6525	9	4933	11	6557
Net cages (m^3)	3	2904	2	.	2	.
Niedersachsen						
Ponds (ha)	143	719	64	449	42	587
Tanks/raceways/trout ponds (m^3)	178	429779	136	.	110	277177
Recirculation systems (m^2)	37	.	27	31721	26	28474
Net cages (m^3)	6	3751	.	.	4	10530
Schleswig-Holstein						
Ponds (ha)	35	716	33	725	22	659
Tanks/raceways/trout ponds (m^3)	15	199498	10	245060	6	.
Recirculation systems (m^2)	6	618	5	589	6	954
Net cages (m^3)	6	2837	5	2228	3	.

Source: Statistisches Bundesamt DUSTATIS, www-genesis.destatis.de, accessed on 15 Jul. 19.

Lithuania has the shortest coastline (90.6 km) of all the countries around the Baltic Sea. Lithuanian fish-processing industry is the largest producer and exporter of surimi products in the region. The fisheries sector is export-oriented, and EU countries are the main markets. Over the past decade, aquaculture production has increased by 45%, with a focus on organic farming. Common carp is the main product, with smaller quantities of rainbow trout, sturgeon, African catfish, and European eel.

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Sweden has established many marine protected areas around its coasts. Although the Swedish fishing fleet operates within an area stretching from the Northeast Atlantic to the northern Gulf of Bothnia, the Baltic Sea is by far the most important fishing area. Over the past decade, aquaculture production has increased steadily and is dispersed widely across the country, often in rural areas. Since the 1980s, rainbow trout have been the dominant species, followed by Arctic char and blue mussel.[65]

The promotion of sustainable aquaculture in Poland is one of the primary objectives of the Common Fisheries Policy.[66] Aquaculture production so far is carried out almost exclusively with the use of freshwater. It is limited to the rearing and breeding of about forty species of fish (for consumption, stocking ponds and other fish farming devices and restocking of surface water flowing) and two species of crustaceans (cancer muddy and noble) intended for consumption and stocking of fishing areas.[67]

Aquaculture in Poland currently only provides 30-36 thousand tonnes of fish per market (approx. 15-18%). The production growth possibilities in this sector are immense. In Poland, a specific form of aquaculture has developed – pond carp management, which is a benchmark for extensive sustainable aquaculture. Poland has the largest area of carp ponds in the EU and the most substantial potential for carp production.

As part of intensive aquaculture, however, attempts will be made to conduct aquaculture of marine and euryhaline species (adapted to a broad spectrum of water

[65] Fisheries and aquaculture around the Baltic Sea, Eurofish, 2015.
[66] Operational Program „Rybactwo i Morze" (PO RYBY 2014-2020)Department of Fisheries, Ministry of Agriculture and Rural Development, Warsaw 2014.
[67] Lirski A., Myszkowski L. Polska akwakultura w 2016 roku na podstawie analizy kwestionariuszy RRW-22. Część 1., Zakład Rybactwa Stawowego w Żabieńcu, Instytut Rybactwa Śródlądowego w Olsztynie, 2017

salinity) with high market value (e.g. turbot, salmon, sturgeon, eel) in land-based plants fed with seawater or usually brackish water geothermal water.

Opportunities for the development of mariculture (i.e. a type of aquaculture involving the cultivation of marine organisms) in Poland should be considered against the backdrop of the current situation of Baltic fisheries and inland aquaculture.

There are solutions that for technical reasons can be used in the Polish coastal zone of the Baltic Sea in the forms of closed-loop fish farming (RAS), offshore cage culture and sea ranching. For social, political and environmental reasons, the least chance for public acceptance is offshore cage culture in the open sea zone. Only the combination of this method with wind farms theoretically might occur in the Polish Baltic zone. The future of fish farming depends strictly on the political decisions and fisheries policy pursued by Poland and other Baltic countries. However, the development of mariculture in closed circuits will depend mainly on economic factors: the demand for exclusive mariculture products, the availability of capital and land, as well as competition from other countries developing mariculture in better environmental conditions.[68]

Coastal and sea tourism

As part of blue growth, local ports can be part of the development of maritime and coastal tourism. As an element of the EU's "Blue Growth" strategy, the coastal and maritime tourism sector has been identified as an area with extraordinary potential for smart, sustainable and inclusive Europe.[69] Moreover, about half of the tourist overnight stays are booked in coastal areas making coastal and maritime tourism (including the cruise sector) the most significant maritime sector in Europe

[68] Sadowski J. Perspektywy rozwoju marikultury w polskiej strefie przybrzeżnej Bałtyku [w:] Przyszłe wykorzystanie polskiej przestrzeni morskiej dla celów gospodarczych i ekologicznych, Instytut Morski w Gdańsku, Gdańsk, 2009.
[69] European Commission, ec.europa.eu/maritimeaffairs/policy/coastal_tourism, accessed on 01.02.2019.

concerning added value and employment. Furthermore, European coastal tourism provides jobs for 3.2 million people, generating over 183 billion euro of added value a year.[70]

Tourism depends on a healthy environment and the sustainable use of natural capital. However, activities are often concentrated in already densely populated areas, which leads to a significant increase in water demand, generation of more waste and emissions from air, road and sea transport during peak periods, increasing risks associated with soil impermeability and reduction of biodiversity (as a result of infrastructure development), eutrophication and other pressures.

The EU's Natura 2000 network protects vulnerable coastal and marine habitats that, when properly managed, can offer significant recreational opportunities and contribute to sustainable growth and employment. EU rules, such as the Water Framework Directive and the Marine Strategy Framework Directive, require the Member States to ensure functional coastal and marine water status, which is a pre-condition for successful tourism development.

The Commission is addressing the issue of emissions from recreational craft. Besides, ships receiving shore-side electricity while in port can significantly reduce fuel consumption and reduce noise and air emissions. For now, however, only a few European ports have invested in these technologies. Electricity supply and integration of smart energy networks should be the subject of further research and promotion.[71]

[70] Vandaele, D., Gilté, M., Billiet, L., Dauwe, S., Pirlet, H., Belpaeme, K., & Fidlers, G. 12 Tourism and recreation.
[71] European Strategy for Greater Growth and Employment in Coastal and Maritime Tourism, Communication from the Commission to the European Parliament, the Council of the European Economic and Social Committee and the Committee of the Regions, European Commission, Brussels 2014.

The Belgian coast is a popular holiday destination as well. Residential tourism accounted for more than 5 million arrivals and 30 million overnight stays in 2016. The number of day-trippers varies between 16 and 19 million annually.[72]

The total spending of coastal tourists amounts to approximately 2.9 billion-euro Oostende is one of the ten towns on the Belgian coast. The city has a lot more to offer besides beaches. There are many opportunities for sports and relaxation, strolling and shopping, music and museums. The city has many attractions, for example, Fort Napoleon, Royal and Venetian Galleries designed in 1900, Mercator museum ship or bunkers and trenches from World War I and World War II.

Figure 79. Cruise ship in Oostende Port

Source: Oostende Port webpage, www.portofoostende.be/activity/cruises, accessed on 20.04.2020.

[72] Vandaele, D., Gilté, M., Billiet, L., Dauwe, S., Pirlet, H., Belpaeme, K., & Fidlers, G. 12 Tourism and recreation.

The Port of Oostende is open to cruise ships. Oostende is a medium-sized Belgian city, which has all the assets of a large town. Oostende is also home to an international freight and passenger airport. The Port of Oostende welcomes about 20 cruises every year. There is an ideal connection with other Belgian cities in the hinterland by plane, by the highway and by train. The cruise berth has direct access to the renovated station in the city centre.[73]

During the past 80 years, the coastlines in Denmark has been protected from development and construction. However, in 2014 the Danish politicians opened for softer regulation at the Danish coastline and invited municipalities and other actors to propose tourism development projects within the hitherto protected coastal zone. The call for development projects, it was explicitly stated that the projects should be sustainable.[74] Over the past ten years, Danish coastal tourism has been operating in a rapidly developing competitive European market, and the international demand for coastal vacations in Denmark has declined. There are several small businesses which are not particularly well connected.[75]

In 2015, coastal and nature-related tourism generated 46% of total tourism revenue, while city tourism and business tourism generated 25% and 28%, respectively. Copenhagen accounts for 24% of the country's total tourism revenue, while the Capital Region accounts for 41%.[76]

Coastal areas in Poland are considered the most attractive for tourists. They are characterized by a significant accommodation base, as well as high intensity and density of tourist traffic. These regions are most frequently visited by domestic

[73] Where maritime industry meets research & development. https://www.portofoostende.be/sites/default/files/about/folderPortofOostende_2019-05-20_web.pdf
[74] Andersen, I. M. V., Blichfeldt, B. S., & Liburd, J. J. (2018). Sustainability in coastal tourism development: an example from Denmark. Current Issues in Tourism, 21(12), 1329-1336.
[75] Institut for Kultur og Læring, www.kultur.aau.dk/forskning/projekter/innocoast/danish-coastal-tourism/, accessed on 20.04.2020.
[76] OECD (2018), "Denmark", in OECD Tourism Trends and Policies 2018, OECD Publishing, Paris.

and foreign tourists, especially on longer trips. The degree of utilization of the accommodation base is high.[77]

The cities where seaports are located are also the largest seaside resorts of the Polish coast. They attract many tourists thanks to their recreational amenities. Local seaports are also a place for selling fresh fish. There are a lot of tourist and fishing cruises being organized.

Swedish coastal tourism is rapidly growing. Sweden's west and the south coast is the place of the world's best seafood. Tourist also can spot seals from a kayak, have a floating sauna or soak in a seaweed bath at a spa. There also is Sweden's first national marine park, Kosterhavet, centred on the car-free Koster Islands with their unique coastline of beaches and rocky islands.

[77] Hącia, E. (2017). Turystyka jako specjalizacja gospodarcza polskich regionów nadmorskich. Ekonomiczne Problemy Turystyki, 38(2), 145-155.

Figure 80. Coast ferries in Sweden

Source: Visit Sweden, visitsweden.com/where-to-go/, accessed on 20.04.2020.

Swedish coast is filled with fishing villages. Coastal ferries are thriving and are the best way to see Sweden's islands and archipelagos. The archipelagos of Stockholm and Gothenburg are probably the most famous Swedish archipelagos, but there are a lot of other archipelagos from north to south.[78]

The Baltic Sea in Lithuania is a place loved by fishers, experienced yachters and cruise ships, whose passengers can discover many tourist attractions here. These include travelling dunes said to be among the largest in Europe or the UNESCO-protected Curonian Spit National Park. The coastal region of Lithuania is also home to the traditional Sea Festival, sailing regattas and music festivals.[79]

[78] Visit Sweden, visitsweden.com/where-to-go/southern-sweden/vastsverige/west-coast-archipelago/, accessed on 20.04.2020

[79] Lithuania. Real is beautiful, lithuania.travel/en/news/by-the-baltic-sea, accessed on 20.04.2020.

Figure 81. Lithuanian coast

Source: Real is Beautiful Stock, photography by M. Dizaineris, lithuania.travel/en/news/by-the-baltic-sea, accessed on 20.04.2020.

Undoubtedly, in terms of maritime coastal transport and coastal tourism, the location along the international waterway E 60 can be a significant advantage of local ports. This route has great tourist potential and for it can become a crucial link between local ports. All ports discussed in the report are in areas with high tourist values, so launching passenger tourism on this route would undoubtedly be very interesting and would attract many tourists. Unfortunately, there is currently no regular ferry tourism along the E 60. Regular lines in Poland connect only Kołobrzeg and Bornholm.

Renewable energy

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Some of the local ports located in Western Europe are involved in research related to innovation projects or renewable energy sources. Many of them are also actively involved in servicing existing offshore wind farms.

The blue economy and circular economy are some of the main focuses of the Oostende Port, Belgium. The port aims to excel in Blue Growth by offering dedicated port facilities, efficient infrastructure, research and innovation partnerships and an extended business network to both national and international companies.

Port of Oostende houses over 50 companies active in the offshore wind business forming a cluster. The port is home for REBO offshore wind terminal which provides infrastructure and services for the construction and operations & maintenance of the wind farms in the North Sea. There are berths for Installation Vessels, SOVs (Service Operation Vessels) and CTVs (Crew Transfer Vessels).

Figure 82. Port of Oostende.

Source: Oostende Port webpage, www.portofoostende.be/activity/offshore-installation, accessed on 17.04.2020.

Blue Accelerator is a unique maritime testing platform at sea, approximately 500 metres away from Port of Oostende. This living lab will enable innovative projects to be launched for various marine and maritime sectors in real-life conditions at sea. Nemos, a new generation of wave energy converters, is the first system that is tested at the Blue Accelerator. Laminaria's wave energy converter (WEC) converts waves from all wave directions, heights and lengths at the same time. It is equipped with a unique storm protection system.[80]

Some of the local ports in Germany also offer services to offshore wind farms. As a deep-water port in the northeast of Germany, the Mukran Port offers ideal nautical and sea geographic conditions for serving the offshore wind industry as a base port. Short distances to the offshore wind farms and easy port approach without estuary and pilot services ensure distinct cost advantages for installation and service logistics. With a water depth of up to 10.5 m, the port can be entered by all conventional offshore water vessels. The newly built Offshore Terminal South has already proved its efficiency during the construction of the offshore wind farms „EnBW Baltic 2"and "Wikinger". The "Arkona Becken" offshore wind farm is currently being completed by the energy supplier E. ON.[81]

[80] Where maritime industry meets research & development. https://www.portofoostende.be/sites/default/files/about/folderPortofOostende_2019-05-20_web.pdf
[81] Mukran Port webpage, www.mukran-port.de/services/offshore-wind.html, accessed on 17.04.2020.

Figure 83. Installation of OWF „EnBW Baltic 2", Mukran Port.

Source: Mukran Port webpage, www.mukran-port.de/services/offshore-wind.html, accessed on 17.04.2020.

With the construction of a completely new port area for the operation of offshore wind farms and related maintenance services, the port is currently being transformed from a typical installation port to a location where a wide range of services can be sited for more than 25 years.[82]

In particular, the wind industry has become a major economic actor in German coastal areas. In cities like Emden, Cuxhaven and Bremerhaven, clusters of manufacturers, suppliers, operators, planning companies and financial services are developing. For the most structurally weak rural areas along the German North Sea coast, this is a significant opportunity for economic development and diversification. However, the spatial demands of the rather new wind sector need to

[82] Offshore Wind - Mukran Port EN. https://www.mukran-port.de/services/offshore-wind.html

be made compatible with traditional and long-established sectors such as fishing, shipping and tourism as well as with the demands of nature conservation and environmental policies such as the Marine Strategy Framework Directive (MSFD).[83]

One of the investment projects in port of Vordingborg is the expansion of the existing port through the creation of additional quays. The green aspect of the project is that waste/recycled materials are used (especially for filling) which would generally go to a landfill. It is beneficial for the investor because he is paid for receiving the waste instead of paying for conventional materials. Secondly, there is an environmental benefit for society because less material goes to a landfill. Furthermore, a port expansion with conventional materials would require much sand, which must be dredged from the seabed in a rather energy-intensive process. However, the operation period of the expanded port is still uncertain. Even the details of the construction in the final phases of the expansion are unknown.[84]

In the Polish Exclusive Economic Zone (EEZ), a wind farm Bałtyk Środkowy III with an area of approx. 117 km^2 is planned, located approximately 23 km north of the shoreline, at the height of the Smołdzino commune and the Łeba municipal commune).

This investment will consist of the following elements:[85]

- maximum 120 wind farms (Elektrownia Wiatrowa – 'EW'), with such essential elements as the foundation, tower, nacelle with power generator and rotor,
- up to 6 offshore power stations ("MSE"),

[83] Kannen, A. (2014). Challenges for marine spatial planning in the context of multiple sea uses, policy arenas and actors based on experiences from the German North Sea. Regional Environmental Change, 14(6), 2139-2150.
[84] Jahn, M., & Wedemeier, J. (2018). Developing low carbon port potential: Cost benefit & carbon footprint analyses (No. 111). HWWI Policy Paper.
[85] Offshore wind farm Bałtyk Środkowy III, SMDI Advisory Group, Warsaw 2015

- offshore power and telecommunications cables, connecting:
  - EW with each other (in cable circuits),
  - EW groups with internal marine power stations,
  - internal marine power stations among themselves, internal MSE with external (being part of another project) offshore electricity stations (optional).

Figure 84. Location of the Bałtyk Środkowy III wind farm

Source: Offshore wind farm Bałtyk Środkowy III, SMDI Advisory Group, Warsaw 2015.

Before the commencement of construction, the Investor will select a construction and assembly port. It will take place unloading farm components from supply ships, their storage to ensure continuity of deliveries to the place of installation during favourable weather conditions, assembly of nacelles, rotors,

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towers, loading of individual elements or partially assembled components on construction and assembly vessels 'jack – up' or other installation units. The ports of Gdańsk, Gdynia, Świnoujście and Ronne Havn (Denmark) are being considered. Local ports of the Polish coast cannot be considered at this stage, and the construction of this wind farm will not affect their development.

Before commencing operation, the Investor will also choose the operating port where the farm management centre will be located. It is not excluded to place a management centre at sea. The operating port should be suitable for short-term maintenance and rapid response.

The ports of Gdańsk, Gdynia, Kołobrzeg, Władysławowo, Ustka, Łeba and Darłowo are currently being considered. Therefore, at the exploitation stage, one can speak of the impact of wind farms on the development of local ports. The IMF's impact on the port is visible. The location of the wind farm management centre in the port area will be associated with the improvement of its infrastructure in each area. It will also create a certain number of jobs for the highly qualified staff serving this centre.

Blue biotechnology[86]

The depletion of fossil fuels (i.e. oil) and the adverse environmental impacts of conventional energy sources is one of the most critical problems facing humanity today. For this reason, research is moving towards the development of renewable energy sources in many countries. Biofuels are one such energy source. Renewable, non-toxic and biodegradable biofuels have a significant advantage over traditional sources as a future energy source.

Microalgae are one of the most promising renewable sources of biofuels. These are single microscopic cell, fibres, colonies or co-genes forming

[86] Determining optimal growth conditions for the highest biomass microalgae species in Lithuanian part of the Curonian Lagoon, SUBMARINER Project, Klaipeda 2013.

photosynthetic organisms that grow in various types of watercourses, including hot thermal springs or lakes with extremely salty salt. Microalgae can be grown in closed or semi-fabricated photobioreactors or in open, shallow ponds to obtain biomass, which can then be processed to extract the lipid portion for fuel production. Algae biomass and its residues can also be used as a substrate for the fermentation of ethanol (also an essential component of several types of fuel), for the production of biogas as a fertilizer, as a dietary supplement for animals used in aquaculture or storage resources, or it can simply be burned to generate heat and electricity.

Cultivation of microelements, like macros or macrophytes, can be combined with biological methods of wastewater treatment. NASA has developed a new, beneficial technology to use micronutrients grown in osmosis bags to settle into flowing wastewater that will be integrated with biorefineries to produce products from renewable sources, such as diesel or fuel. Micro-algae were called the third generation "biofuel" (the first is ground-based crops – maize and other agricultural products, and the second – lignocellulose agriculture and forest residues, non-food crops). Microalgae as a fuel source are a better source compared to sources 1 and 2 generations because they do not create competition between agriculture and the fuel industry and do not need arable land and some food products that are currently used for the production of bioethanol. They can be grown in sewage or saltwater and give much higher yields per hectare of land per year.

Local ports can be excellent bases in the production process; they can also act as service stations and can create excellent conditions for future highly qualified staff. This aspect of blue growth can largely determine the development of local ports.

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Summary and recommendations

SUMMARY AND RECOMMENDATIONS

The above study aimed to analyse local seaports located in the South Baltic Region as development centres. The ownership and management structure of ports is diverse. Most of the investigated local ports in the South Baltic area are owned and operated by the municipalities in whose territories they are located. They also have different economic profiles and types of companies operating in their area. Most of these companies are shipyards. Despite a long history and rich shipbuilding traditions in most of the South Baltic local ports, however, they are rather prone to bankruptcy under a hefty competition. This threat for South Baltic shipyards makes them look for new market niches. Production of human food products and animal feed is another important field of activities of companies in the investigated local South Baltic ports, especially in Denmark. Some of the ports also host innovative enterprises from the sectors, which are entirely unrelated to the traditional port activities.

The conditions and perspectives for the development of small ports strictly depend on such factors as the level, pace and directions of economic and social development of the country and region, the development of local and regional transport infrastructure, as well as the European Union's policy on the maritime sector. Actions to increase the attractiveness and use of the economic potential of maritime cities and municipalities are particularly important because of the persistently high unemployment rate in coastal areas compared to other regions of the analysed countries. The global maritime economy, including local seaports, is prone to the same laws of size economy, meaning that larger ports have better opportunities to become more flexible and occupy a broader range of niches. A mono-profile of the local port services is unsustainable and must change.

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Most of the ports in the South Baltic Region are based on fisheries. Due to declining stocks and fishing quotas, especially cod, which is crucial for the profitability of fishing, the steady decline in fishing vessels could be noted. An alternative to the decreasing importance of fishing activities in small seaports may be the development of other areas related to the functioning of ports. In recent years, the growing importance of recreational and leisure activities can be noticed.

All seaports that are not essential for the national economy, both those of a regional and local nature, are substantial elements of sustainable development of coastal areas due to the opportunities that create for many different local stakeholders. The port's impact on the economy in the micro- and the macroeconomic sphere is complex and multidirectional.

The relations of seaports with towns and the development of these seaport towns have been classified in different typologies. Almost all local and regional ports and urban areas in the South Baltic area fall within the categories of coastal port towns, urban ports or 'out-ports'. Meanwhile, Oostende in Flanders, Cuxhaven in Lower Saxony, and five ports in the South Baltic area can be classified as a 'city-port', i.e., an optimal version of relations between the urban area and the port.

Port labour force are very dependent on the structure cargo flows handled in the port. Port system employs a large labour force linked to ships loading and unloading operations, ship operations and services, land transport, logistics activities, cargo service, industrial production and government agencies. From the port-region relationship, it is difficult not to notice the relationship between the port's development opportunities and the possibilities of acquiring qualified staff. The port workers of the EU are employed by a diversity of employers which also makes it challenging to evaluate the number of port workers.

It is also worth noting that blue and green growth may have a significant impact on the development of local ports in the South Baltic region. However, it is

difficult to determine the impact of each of the sectors of the blue and green economy for each local port. As part of blue growth, local ports can be part of the development of maritime and coastal tourism. Mariculture is currently the fastest-growing food sector in the world, which is also one of the development opportunities for local seaports. Some of the ports located in Western Europe are involved in research related to innovation projects or renewable energy sources. Many of them are also actively involved in servicing existing offshore wind farms.

Local seaports located in the analysed area differ in many aspects. There are also many opportunities for their further development. This particularly applies to ports located in Eastern Europe, which must adapt their business profile to changing economic conditions. This is caused, among others, by the decreasing importance of fisheries, as well as the change in European policy towards running a circular economy and the need for blue and green development. This direction of ports' development is extremely important because it translates into the development of all coastal regions.

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LIST OF ABBREVIATIONS

CD	Community Design
CTV	Crew Transfer Vessel
EEZ	Exclusive Economic Zone
EU	European Union
FCL	Full Container Load
GRP	Gross Regional Product
GT	Gross Tonnage
HELCOM	Baltic Marine Environment Protection Commission
ICES	International Council for the Exploration of the Sea
ICT	Information and communication technology
IMF	International Monetary Fund
LCL	Less than Container Load
MSFD	Marine Strategy Framework Directive
NAFO	North-West Atlantic Fisheries Organization
NASA	National Aeronautics and Space Administration
NEAFC	North-East Atlantic Fisheries Commission
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
RAS	Recirculating Aquaculture System
SME	Small and Medium Enterprises
SOV	Service Operation Vessels
SPRFMO	South Pacific Regional Fisheries Management Organisation
SRLGD	Fisheries Association Local Action Group
UNESCO	United Nations Educational, Scientific and Cultural Organization

WEC Wave Energy Converter

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