MENON ECONOMICS

REPORT

THE COMPETITIVENESS OF THE ESTONIAN MARITIME INDUSTRY

MENON PUBLICATION # 45/2023

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Preface

On behalf of the Ministry of Economic Affairs and Communications Menon Economics has benchmarked Estonia as a maritime center along five pillars and corresponding indicators. The five pillars are (i) shipping centers, (ii) maritime finance and law, (iii) maritime technology, (iv) ports and logistics, and (v) attractiveness and competitiveness. The background for the project is that the Ministry wants to acquire a knowledge base of how they can increase the size and economic importance of their maritime industry. In 2020, legislation to increase the competitiveness of the Estonian maritime industry was introduced, but so far these measures seem to have had little effect on the growth of the maritime industry in Estonia. Due to this, the government wants to increase the effectiveness of the measures put in place to improve the competitiveness and attractiveness of the nation's maritime industry.

Menon analyses economic issues and provides advice to companies, organisations, and authorities. We combine economic and commercial expertise in fields such as industrial organization and competitive economy, strategy, finance, organizational design, and social profitability. We use research-based methods in our analyses and work closely with leading academics in most disciplines. Since the start of the company, deliveries to the maritime industry has been one of the cornerstones in the company. Because of this, Menon has an extensive knowledge about the maritime industry and its development in the last 20 years.

We wish to thank the Ministry of Economic Affairs and Communications for giving us the opportunity to conduct this analysis.

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March 2023

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Content

Summary

The Ministry of Economic Affairs and Communications in Estonia wants to acquire a knowledge base of how they can increase the size and economic importance of their maritime industry. In 2020, legislation to increase the competitiveness of the Estonian maritime industry was introduced, but so far these measures seem to have had little effect on the growth of the maritime industry in Estonia. Due to this, the government wants to increase the effectiveness of the measures put in place to improve the competitiveness and attractiveness of the nation's maritime industry. To do so, they wish to assess all parts of the maritime industry in the country. To answer this, we have benchmarked Estonia as a maritime center along five pillars and corresponding indicators. The five pillars are (i) shipping centers, (ii) maritime finance and law, (iii) maritime technology, (iv) ports and logistics, and (v) attractiveness and competitiveness. When assessing the five pillars of the maritime industry and comparing Estonia to other leading maritime cities in the world, Estonia ranks as the 100th leading maritime center in the world out of the roughly 15,000 cities[1] tracked in the Leading Maritime Cities (LMC) report. Singapore is ranked as number one, followed by Rotterdam and London. It is important to bear in mind that large countries, like China and the USA, have many cities in the ranking. For example, China has 8 cities on the top 50 list. Hence, Estonia would have received a significantly higher rank if it was compared to countries, not cities. There is wide variation in how Estonia scores on each of the five pillars. Its highest ranking is on the attractiveness and competitiveness pillar and the lowest is on the shipping center pillar.

Pillar 1: Estonia as a shipping center

To be recognized as a leading center for shipping, a city or country must be the registered home to a strong number of shipowners and ship managers, both in terms of fleet size and fleet value. This pillar captures the dimension of how developed the shipping industry in Estonia is. This is done by looking at a series of measures that give an indication about the size and sophistication of the shipping industry. Estonia's ranking on this pillar is number 97, as seen in the table below. According to Clarksons World Fleet Register, there are 51 shipping companies registered in Estonia. In comparison, there are 221 shipping companies registered in Athens. However, the latter are on average significantly larger. The shipping community in Estonia consists of shipowners delivering a range of different activities, from ferries and cruise ships to general cargo, tugboats, fishing, and ice breakers. Most of the ships that are active today are listed as multipurpose ships in the Clarksons fleet database. This implies that the shipping industry in Estonia is less specialized, where ships serve multiple purposes at the same time.

Table A: Ranking on the pillar: Shipping centers. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Athens**
2	**Singapore**
3	**Tokyo**
4	**Shanghai**
5	**Hamburg**
97	**Estonia**

[1] Estonia is of course not a city, and hence, not directly comparable to the city regions in the LMC report (which are defined as an area less than two hours' drive from the city center). However, most of the maritime activities in Estonia are within two hours' drive from Tallinn center, so in practice, the difference is not big. The entire Netherlands is included in Rotterdam city region, and most of Denmark is included in Copenhagen.

There is a total of 52 shipping companies of varying size in Estonia. In total, these 52 shipping companies have a fleet of 165 ships.[2] There are also 25 ships managed by Estonian ship managers. This implies that the total number of ships being owned and/or operated from Estonia is 190. There is a potential to increase the size and sophistication of the shipping community in the years to come, both due to strong market growth in established segments and to local market opportunities, most notably connected to offshore wind.

One distinct feature of a maritime state is a fleet sailing under its own flag, including cargo and passenger ships engaged in international maritime transport. This is not the case for Estonia today. As of today, there are 58 ships sailing under the Estonian flag. This is equivalent to 30 percent of the total fleet of 165 ships owned by the 52 shipping companies in Estonia. Having few ships sailing under its national flag means that it can be more difficult to ensure the continued development of the maritime sector and to sustain the maritime competence. Estonia cannot charge register fees for vessels that are not in the register, meaning less revenues for the state from this sector. This is also the case for social taxes, as the social tax is paid in the country the vessel is registered.

Even though the government has been working on enhancing the competitiveness of the Estonian flag and the maritime industry, the actors in the industry perceive the legal framework related to the flag registration as difficult to understand. Furthermore, the information is considered as not easily accessible. This makes it difficult for shipowners to evaluate the terms of sailing under the Estonian flag. In addition, the process of changing the flag is described as too complex, and the same goes for the process of having foreign workers approved to work on Estonian ships. The availability of e-residency was mentioned as a potential incentive to switch to the Estonian flag, but the information about the process is not accessible enough. Lastly, the tax scheme is described as less favorable compared to other flag states, such as Latvia, which is perceived as more favorable e.g. in terms of tax schemes.

Pillar 2: Maritime Finance and Law

Most maritime services are globalized and often located around ship owning companies. The shipowners' activities stimulate the activity in the rest of the maritime industry by being, presumably, demanding customers. Hence, a country that has a large shipping industry will most likely also have several maritime service providers. This is however not the case for Estonia. This pillar captures development, presence, and efficiency of the maritime law and finance system in the country. Overall Estonia ranks as number 75 in the LMC 2022 report for the maritime service pillar, as seen in the table below. This is mainly driven by the high valuation of the shipping companies on the stock exchange, which is due to the presence of Tallink Group.

Table B: Ranking on the pillar: Maritime Finance and Law. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**New York**
2	**London**
3	**Tokyo**
4	**Oslo**
5	**Paris**
75	**Estonia**

[2] Note that this includes only ships registered in the Clarksons database, and there may be more ships in Estonia. Talking to actors familiar with the maritime industry, it is estimated that there are about 155 ships larger than 100 GT and an additional 334 ships with GT below 100.

The presence of a developed and specialized legal system is of high importance for a strong maritime industry. There are three maritime law firms in Estonia according to the World Shipping Register[3]. In comparison, the number of maritime law firms in London is 112. This reflects that the legal framework around the shipping community is not very developed in Estonia. There is a lack of court precedent due to the fact that there has only been a small number of cases so far after Estonia re-gained independence in 1991. This is a source of uncertainty for ship owners and ship managers, as there is too little knowledge about the legal consequences of various incidents and casualties. The maritime legal framework is perceived as difficult to navigate in and essential information about the system is inaccessible.

The presence of a well-developed insurance and finance system is also of importance for the maritime industry. There are however no banks in Estonia that specialize in the maritime industry. The lack of specialized banks forces actors to use banks abroad to get the banking and financial services they need. This is a process that is described as tedious, even though Estonia is part of the European Union. The lack of maritime competence among and within the banking and finance providers, for example that the banks do not understand how to valuate ships properly when they are approached for loans, means that Estonian actors get lower credit limits when they want to build ships. Even though Estonia scores low on both indicators above, this does not necessarily mean that the country needs to build up a maritime financial system in line with Singapore, Oslo and London. However, for the shipping companies to find it more attractive to be in Estonia, there is a need to increase the maritime competence within the national banks, so that the actors do not have to use foreign banks to finance their fleet.

Pillar 3: Maritime Technology providers

This pillar captures the dimension of whether the maritime industry in the country is on the forefront of the technology in the industry. This includes an assessment of seven objective indicators related to the shipyards, equipment suppliers, maritime R&D and innovative start-ups. Estonia ranks as number 50 on this pillar, as shown in the table below, with the maritime education institutions being the indicator with the best score. For Estonia to move higher up on the ranking here, there is a need for increased investments in maritime R&D projects and the maritime educational system to further develop the maritime industry in Estonia. Furthermore, there is a need to align Estonia's high-quality ICT sector with the maritime industry, as the industry is experiencing rapid technological change.

Table C: Ranking on the pillar: Maritime Technology providers. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Singapore**
2	**Oslo**
3	**Busan**
4	**London**
5	**Shanghai**
50	**Estonia**

[3] We have also been in contact with TGS Baltic, another maritime law firm operating in Estonia. TGS Baltic is not listed in the world shipping register, most likely because they operate in a variety of industries, and their practice extends across the Baltics.

Estonia has the smallest shipbuilding industry in the Baltics measured in total CGT. The Latvian shipbuilding industry is the largest in the Baltics, closely followed by Lithuania. Based on the findings in the interviews conducted for this report, the variation is mainly due to differences in the cost level. Latvia and Lithuania have a comparatively cheaper labor force, and the labor-intensive shipyard industry therefore has a cost advantage in these countries. It should be noted, however, that some countries with a higher cost of labor are competitive with Latvia and Lithuania. Norway for example has a larger and more developed shipyard industry, despite the high labor costs.

The maritime suppliers' technological level is perceived as relatively low among the actors in the industry. In the interviews it was mentioned that there are few specialized suppliers, and to get the technology needed it is necessary to go out of Estonia to buy goods and services. Estonia has been determined to build a strong and world class ICT industry. There seems to be a huge potential for stronger collaboration and indeed integration with the maritime industry, an industry that is facing immense needs for digitalization, which is also essential for decarbonization. Aspects such as autonomous vessels (for example water shuttles), sensors and internet of things, digital twins, and other technologies will be central in the future. To be successful in developing these types of technology, cooperation between the maritime industry and the ICT industry is essential.

Pillar 4: Ports and logistics

Access to ports and logistics services is essential for a well-developed maritime country. The more developed the logistics in the country, the easier it is for foreign ships to dock and deliver to these ports. This pillar assesses the ports and logistics in a city/country by using four objective indicators: TEU in port, Size of ports operation, Line Shipping Connectivity Index (LSCI), LNG available at ports. As seen in the table below, Estonia ranks low on this pillar, the lowest ranking of all the five pillars. This is to a large extent due to the relatively low amount of TEU in the ports compared to larger ports in other nations. There are 236 ports in Estonia, which handled a total of roughly 40 million tons of cargo in 2021. Around 53 percent of the cargo was transit goods, while the remaining cargo was import and export of goods (non-transit goods). The fact that more than half of the cargo handled in Estonian ports consists of transit goods illustrates the importance of Estonian ports for the surrounding countries, working as a gateway for East European countries to the global market.

Table D: Ranking on the pillar: Ports and logistics. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Shanghai**
2	**Rotterdam**
3	**Singapore**
4	**Hong Kong**
5	**Guangzhou**
217	**Estonia**

Ports with varied and advanced logistics services increase the attractiveness of the country because this will help the shipping companies to operate in the best way possible. There are several ways in which a port can increase its attractiveness, e.g., the port can offer the possibility to bunker alternative fuels, advanced technological solutions to make the port more efficient etc. The connection between ICT-developments and developments in

the Estonian maritime industry will be significant in the ports and logistics sector. Several interview subjects mark port digitalization as a crucial point, along with autonomous ships. As Estonia is a forward-leaning country in terms of ICT solutions, it can benefit from better implementation of these solutions in the maritime industry. Furthermore, the increased focus on building an offshore wind industry in Estonia also provides opportunities for the ports. Cooperation in the development, construction and maintenance of offshore wind farms will enable new business opportunities while developing local expertise.

Pillar 5: Competitiveness and attractiveness

The more attractive a city/country is for business, the easier it is to stimulate growth in the incumbent industry and to incentivize companies and talented people from abroad to locate in the country. To rate how attractive and competitive Estonia is as a country, the country is ranked based on three objective indicators and a series of subjective indicators. The objective indicators capture important aspects such as ease of doing business, proximity to customers and suppliers, and access to competent workers. Further, it is rated based on the questionnaire and interviews with actors in the industry. Estonia ranks as number 19 on the attractiveness and competitiveness pillar, the highest score among the five pillars. This is mainly due to the ease of doing business and the neutral tax code, which promotes sustainable economic growth while simultaneously allowing for sufficient public income.

Table E: Ranking on the pillar: Competitiveness and attractiveness. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Singapore**
2	**London**
3	**Copenhagen**
4	**Rotterdam**
5	**Oslo**
19	**Estonia**

Even though Estonia scores high on this pillar, the country has yet to build a complete and strong maritime cluster, which is important for the development of the industry in the country. Furthermore, Estonia has mediocre scores on the subjective indicators related to proximity to key customers and presence of specialized and competitive suppliers. This indicates that the cluster is far from complete, or, phrased differently, it indicates that there are significant holes in the value chains. Even though the country has several maritime educational institutions, the actors in the maritime industry in Estonia express a concern that there is a lack of relevant competence in the industry and in the country.

Estonia ranks highly on the ease of doing business indicator and is also ranked in first place in the OECD International Tax Competitiveness Index Rankings, as it has been for the last nine years. Maritime companies in Estonia can choose between different taxation schemes, but the actors in the Estonian maritime industry have identified several areas that require improvement to enhance the sector's competitiveness, such as a clearer tax system and tax breaks. It has also been mentioned that the tonnage tax system should be extended to include management companies to encourage them to stay in Estonia. Finally, there have been calls for more liberal labor laws, allowing more foreign workers to work in the maritime industry.

The way forward

Critical success factors for a maritime country may include the acknowledgement of the maritime cluster as a cornerstone of the national and regional economy, as well as engagement with other maritime clusters, utilizing own strengths and supplementing for shortfalls. Further on, the adoption of favorable policies, to allow actors to stay competitive in a globalized and evolving environment is of importance. Based on the findings of this report, there are some measures Estonia could take to increase the competitiveness of its maritime industry. These are related to the following: (i) Enhancing Estonia as a flag state, (ii) the importance of a strong cluster, (iii) the industry's attractiveness will be important to attract relevant competence, (iv) interaction between the industry and academia and (v) opportunities related to the offshore wind market.

Background for the project and methodology

Background

The Ministry of Economic Affairs and Communications in Estonia wants to acquire a knowledge base of how they can increase the size and magnitude of their maritime industry. This is seen as an important area to focus on, as this may increase the reach of the Estonian economy, and in turn lead to growth in the economy. The Estonian government increased the focus in 2020, when they introduced legislation to increase the competitiveness of the country's maritime industry. This legislation included more favourable tax regimes for seafarers and made it easier for foreign shipowners to register ships in the country without having to use Estonian crew. However, these measures seem to have had little effect on the growth of the maritime industry in Estonia.

Due to the minimal effect of the measures that are in place, Estonia wishes to increase the effectiveness of the measures put in place to improve the competitiveness and attractiveness of the nation's maritime industry. To do so, they wish to assess all parts of the maritime industry in the country: Shipping, finance of shipping and shipping law, shipping technology, and ports and logistics, together with Estonia's attractiveness for maritime companies. The Ministry wants to get an understanding of how competitive the Estonian shipping industry is. This knowledge will further be used to increase the attractiveness of the country. This includes two important assessments. The first is to get an understanding of how well Estonia supports its maritime industry, both in the sense of infrastructure and facilitation, and regarding talents to the maritime industry. The second part is to get an understanding about how competitive the Estonian shipping industry is *compared* to other nations.

Methodology

In this chapter we describe the methodology used in the report. The methodology consists of a process in four stages. To answer the two research questions mentioned above, we have used the same methodical model as in the Leading Maritime Cities of the World report (Menon Economics; DNV, 2022) by Menon Economics. In this biennial report, Menon maps the leading maritime cities based on a series of objective and subjective indicators on how attractive and competitive the different cities are. The model looks at two important aspects on how to be an attractive maritime country or city region (where the boundaries were drawn two hours' drive from the city center). Firstly, the city must be an attractive host for the companies. If this is not the case, domestic companies will leave and no foreign companies will choose to locate their business in the city. Secondly, the companies in the city need to be internationally competitive. If not, the industry will "rot at the root". The analysis will include a look at how attractive Estonia is as a maritime country, and how competitive the maritime companies in Estonia are.

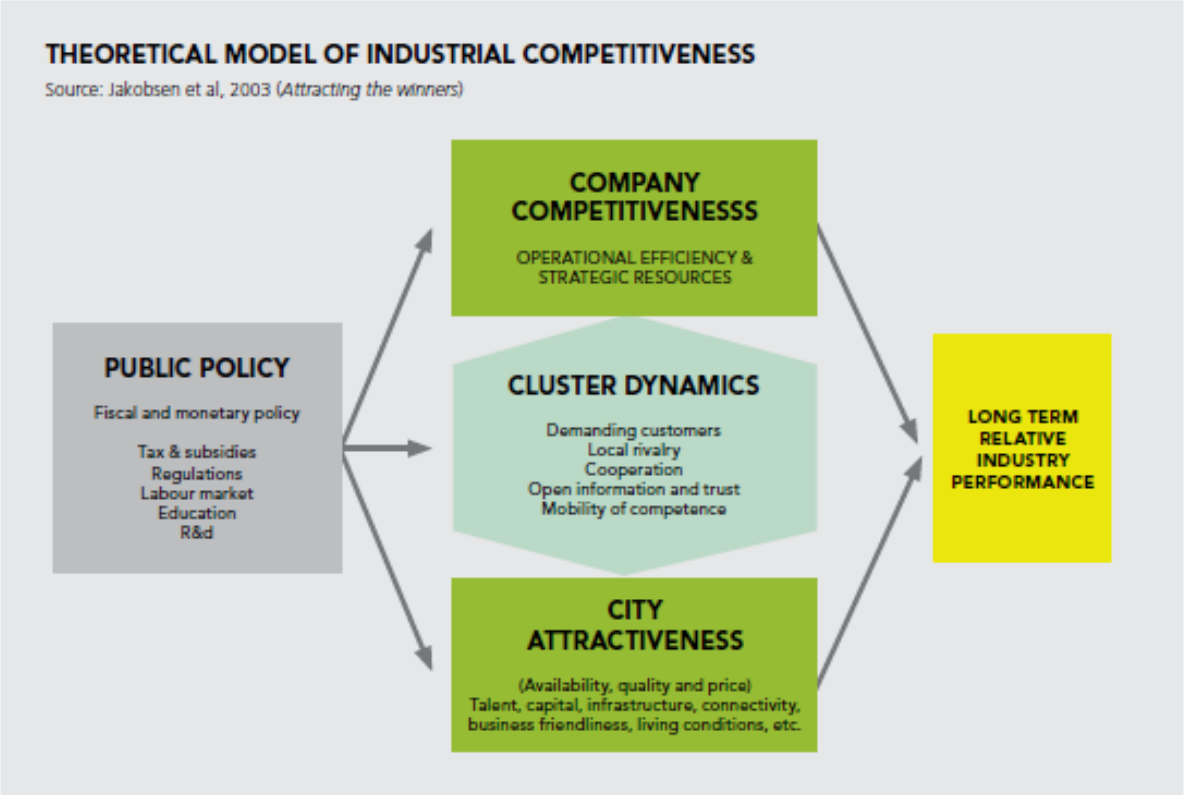
We have compared Estonia to other maritime cities to get a picture of why Estonia has not been able to develop a large maritime industry. In the LMC report we assessed cities. The cities were defined based on a geographical area of a two-hour drive from the city. If we would do the same for Tallinn, this would include almost the whole country. Hence, in this report we assess Estonia as a country. We describe the model used in the following sub-chapters.

The conceptual model

There are many interconnected factors that drive the attractiveness of a city and the competitiveness of the industries located there:

- Strategic location
- Favorable and stable political framework
- Transparent and efficient legal framework
- Proximity to large, demanding customers
- Local rivalry – creates incentives for continuous improvements and innovation
- Abundance of suppliers and service providers
- Specialized universities and research institutions
- Large pool of talent
- Rich and open flow of knowledge and ideas
- Relationships based on trust
- Meritocratic education and career system
- Soft location factors – an attractive place to live for families and individuals

Together, these factors produce spirals of self-reinforcing growth – or decline if the factors are absent. The mechanisms that drive industry competitiveness are summarized in the model below.



For the maritime industry in a city to prosper, two conditions must be satisfied: The companies must be competitive, and the city must be attractive as a host for these companies. These two conditions are mutually dependent: the companies gain their competitiveness from resources available in the city – for example access to capital, talent, and specialized supplies – and the price they must pay for these resources. Accordingly, the attractiveness of the city increases when competitive companies are present in the city. Hence, the clue is to attract the winners (Jakobsen, 2003). Over time, the attractiveness of the cities is gradually shaped by the dynamics of the industry. In an industry with strong cluster dynamics, knowledge is continuously improved and dispersed, upgrading both companies and resources. Finally, governments play a central role in defining the attractiveness of the city. Through various public policy factors like taxes and subsidies, they determine the price of capital, labor, and other input factors. The quality of the resources is to a large extent determined by investments in infrastructure, education, and R&D. Key institutions, including cluster facilitators, contribute to

making a location attractive through active engagement with the maritime industry and introducing initiatives and programs based on industry feedback (Osman, 2020).

The four main elements in the model, public policy factors, the competitiveness of the companies, the attractiveness of the cities, and finally, the dynamics of the industry clusters, are measured and benchmarked for maritime cities across the world.

Attractiveness

To understand the attractiveness of the Estonian maritime industry, we started by looking at the country in the same way as we assessed maritime cities in the LMC report. In the biennial LMC report we gather qualitative information from our global panel of maritime experts. Most of these experts are owners or top managers in maritime companies, while the rest are leading consultants, university researchers or public servants. In addition to their subjective rankings of maritime cities on the four maritime pillars, each expert has evaluated their own city region on 18 indicators that in sum give a comprehensive assessment of the attractiveness. They are also asked to make recommendations about what measures their own city region can take to increase its attractiveness for maritime companies. This data is not revealed in the LMC report, it is only being used for strategic benchmarking of particular cities (or regions/countries) against comparable cities (regions/countries).

We have used the same 18 indicators to benchmark Estonia's attractiveness against the following city regions: Singapore, Oslo, Hamburg and Vancouver. We have therefore sent out a survey to relevant actors in the industry and conducted interviews with some of them.

Competitiveness

To measure the competitiveness of Estonian maritime companies, we have looked at four pillars that constitute a leading maritime nation:

1. Large and sophisticated **shipping** community - with owners, HQ, and operation
2. Specialized technological milieu, composed of **shipyards, equipment suppliers, maritime R&D and innovative start-ups**
3. Complete supply of specialized world class services of **finance, law and insurance**
4. Large **port(s)** with varied and advanced **logistics services**

These four pillars can be measured independently of each other, but it is important to emphasize the interdependency between them. For example, if Estonia can attract large and advanced shipping companies, this will increase the attractiveness for specialized maritime services. It will also stimulate the maritime technology pillar, because equipment suppliers and small innovative companies will get proximity to large, demanding customers. In other words, there are important cluster dynamics between the four pillars. These four pillars are further described in Appendix A.

Questionnaire and interviews

To conduct an own-country assessment of Estonia, we sent out a survey to relevant actors who have an in-depth understanding and knowledge of the maritime industry in Estonia. These actors were chosen in collaboration with the Ministry. In the questionnaire, companies were asked about the presence of markets, suppliers and talents in Estonia compared to alternative locations. They were also asked about the quality of financial and legal services, technological development, and cooperation with the government and with other players in the industry. A total of 28 respondents answered the questionnaire, with a vast majority belonging to service supplier

companies. The respondents both include domestic (Estonian owned) and foreign companies operating in Estonia. The questionnaire can be found in Appendix B.

Furthermore, we conducted 14 interviews with 22 different companies and organizations. Of these, 11 were conducted in person in Tallinn and 3 on Teams. The interviews were conducted to get a better understanding of the results from the questionnaire. The open conversations in the interviews also provided a better perspective of what issues the subjects viewed as more important than others and allowed the players to give their opinion about what measures should be taken to help the industry become more competitive.

Annex 2

An important part of this project is a comparison between Estonia and some selected maritime nations related to five legal and policy items: Ship mortgage, Ship registration, Tax incentives, Tax agreements, and Working conditions. The countries selected for comparison are Lithuania, Latvia, Finland, Denmark, Germany, Portugal, Greece, Cyprus, and Singapore. Information from Annex 2 will be used as a basis for potential recommendations for policy changes, based on these two columns: (i) The Estonian system is more restrictive compared to the compared state and (ii) Recommendation for improvement with respect to increased competitiveness. This part will be delivered in a separate report.

The five pillars of the maritime industry in Estonia

Shipping is a global industry, and being aware of the international competition, maritime cities and countries are developing strategies to enhance their attractiveness to highly productive and innovative companies, and to attract talented individuals. The more mobile the companies, the stronger the competition among countries and cities to attract them. Due to shipping being a global industry, many of the mobile companies are seeking to take advantage of localization advantages in different countries. In combination with the fact that the maritime industry is a high value-added industry, this means that the fight to attract maritime companies is tough. This is especially the case for the shipping industry, being the most mobile sector within the maritime industry. This implies that it is also easy to lose maritime business activities, and that the gains from winning the location race are higher for the less mobile part of the industry (Menon Economics; DNV, 2022).

Based on the methodology described in the previous chapter, we have benchmarked Estonia as a maritime center along five pillars, and corresponding indicators. The five pillars – with a short description of what it takes to be considered a leading city/country on each pillar – are the following:

- **Shipping centers**: A large and sophisticated shipping community – with owners, HQs and operation
- **Maritime finance and law:** Complete supply of specialized world-class services of finance, law and insurance
- **Maritime technology:** A specialized technological milieu, composed of yards, equipment suppliers, maritime R&D and innovative start-ups
- **Ports and logistics:** A large port with varied and advanced logistics services
- **Attractiveness and competitiveness:** Future growth is to be expected from a city that is attractive with regard to ease of doing business, the health of the entrepreneurship ecosystem, the competitiveness of maritime companies as shaped by cities' cluster dynamics, cities' attractiveness for relocating headquarters, operations and R&D.

When we assess the five pillars of the maritime industry mentioned above and compare Estonia to other leading maritime cities in the world, Estonia ranks as the 100th leading maritime center in the world out of the roughly 15,000 cities[4] tracked in the LMC report. It is important to bear in mind that large countries, like China and the USA, have many cities on the ranking. For example, China has 8 cities on the top 50 list. Hence, Estonia would have received a significantly higher rank if it was compared to countries, not cities.

Three of the top 5 cities are Asian, and two cities are European, as seen in Table 1. Singapore has been able to retain its position as a world-leading maritime hub due to its strength in all pillars. Looking five years into the future, the maritime experts predict that Singapore will keep its position as the global leader, while Shanghai will grow in importance and become the second most important maritime city. The race to be the leading city in Europe is still open, with London, Oslo, and Rotterdam as the leading contenders in this regional race. It will also be interesting to see Estonia's ranking in five years given the on-going work of strengthening the maritime industry in the country.

[4] Estonia is of course not a city, and hence, not directly comparable to the city regions in the LMC report (which are defined as including the area less than 2 hours' drive from the city center). However, most of the maritime activities in Estonia are located within two hours' drive from Tallinn center, so in practice, the difference is not big. The entire Netherlands is included in Rotterdam city region, and most of Denmark is included in Copenhagen.

Table 1 Overall ranking 2022 – leading maritime cities of the world. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Singapore**
2	**Rotterdam**
3	**London**
4	**Shanghai**
5	**Tokyo**
100	**Estonia**

Shipping is a global business, encompassing a complex variety of actions taken and services performed, by an equally complex variety of players. Over time, many of these actors gather in specific geographic regions, or cities, thus forming so-called clusters. A maritime cluster can broadly be defined as "a group of industries that are directly and indirectly related to shipping and situated within a certain geographic area" (Shinohara, 2010). Maritime clusters make distinct contributions to the development of national or regional economies and provide strong support for innovation and technological development in maritime industries. Their vital role in enabling international trade and the global supply chain is also evident in their provision of integrated logistics and maritime services in addition to traditional cargo handling-related activities. Overall, companies in a cluster can benefit from research and competence from other companies, which can have a self-reinforcing effect on industry growth. There can be economies of scale in a cluster which extend beyond the individual companies. There are also benefits to being a large community with similar political interests (Menon Economics; DNV, 2022). The maritime industry in Estonia consists of actors within the four first pillars, hence, the cluster perspective is also an important aspect in Estonia's work of strengthening the industry.

The shipping industry

The shipping industry represents the most important infrastructure for trade between the world's continents. More than 90 percent of all merchandise trade is transported by ship. Shipping continues to shoulder the responsibility of providing undisrupted shipments of food, energy commodities and medical supplies across the continents. Hence, shipping companies, by necessity, must be agile and adaptable to this fluid situation and focus on building effective response strategies and plans.

This chapter captures the dimension of how developed the shipping industry in Estonia is. This is done by looking at a series of measures that gives an indication about the size and development of the shipping industry.[5] European cities have historically been dominant in terms of ownership, though this is gradually changing, as Asian shipowners have taken most of the fleet growth in the decade. Asian owners have increased their market share to 42% of the global fleet, up from 36% in 2012 in terms of Compensated Gross Tonnage (CGT), with Chinese owners clustered in Shanghai and Hong Kong facilitating most of this change. The European share of the world fleet, however, has only fallen from 45% to 43%, so the remaining shares have been captured from other continents (Menon Economics; DNV, 2022).

Overall, the Estonian shipping industry ranks 97th out of the roughly 15,000 cities tracked in the LMC 2022 report for the shipping pillars, as seen in Table 2. The most important contributor is the market value of the shipping

[5] *Indicators: fleet size, management and ownership, fleet value, number of shipping HQs, turnover shipping companies, size of environmentally friendly fleet.*

companies, where Estonia ranks as number 52. The next sub-chapters give a description of how Estonia is ranked across the indicators within the shipping center pillar.

Table 2 Ranking on the pillar: Shipping centers. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Athens**
2	**Singapore**
3	**Tokyo**
4	**Shanghai**
5	**Hamburg**
97	**Estonia**

To be recognized as a leading center for shipping, a city or country must be the registered home to a strong number of shipowners and managers, both in terms of their fleet size and their fleet value. To assess Estonia's fleet, the following four indicators are taken into consideration: the size of the shipowners' fleet, the size of the management fleet[6], the total turnover for listed shipping companies in Estonia, the value of the fleet[7] and alternative fuels capable fleet size[8]. All these dimensions describe different important parts of a fleet.

The Estonian shipping community

The number of shipping companies located in a city or country, or choosing to have their headquarters in a city, gives a picture of the characteristics of the shipping community in a country. Some cities may have several shipping companies registered in the city, where most of them are small, operating only regional vessels. This is for example the case in Jakarta, which was ranked on top in the Leading Maritime Cities report in 2022 on this pillar, with 233 shipping companies registered in the city. Athens was ranked as number two with 221 shipping companies; however, this shipping community consists of small family-owned companies, exhibiting low volumes of communication or cooperation with each other. On the other hand, there is Singapore which was ranked as number three. Singapore has managed to attract owners and managers from all around the world, serving each segment of the shipping industry, showing the importance of a strong maritime cluster and a determined government. Singapore owes much of its success to the incentives provided by Singaporean Register and the active role of MPA Singapore in attracting shipping companies to the city/country. In the cities following the three on top, there are far fewer shipping companies. However, these are for the most part large corporations, owning a diverse portfolio of vessels.

[6] Data was compiled for the entire world fleet and vessels were then assigned to the individual cities where their owners and managers are located.

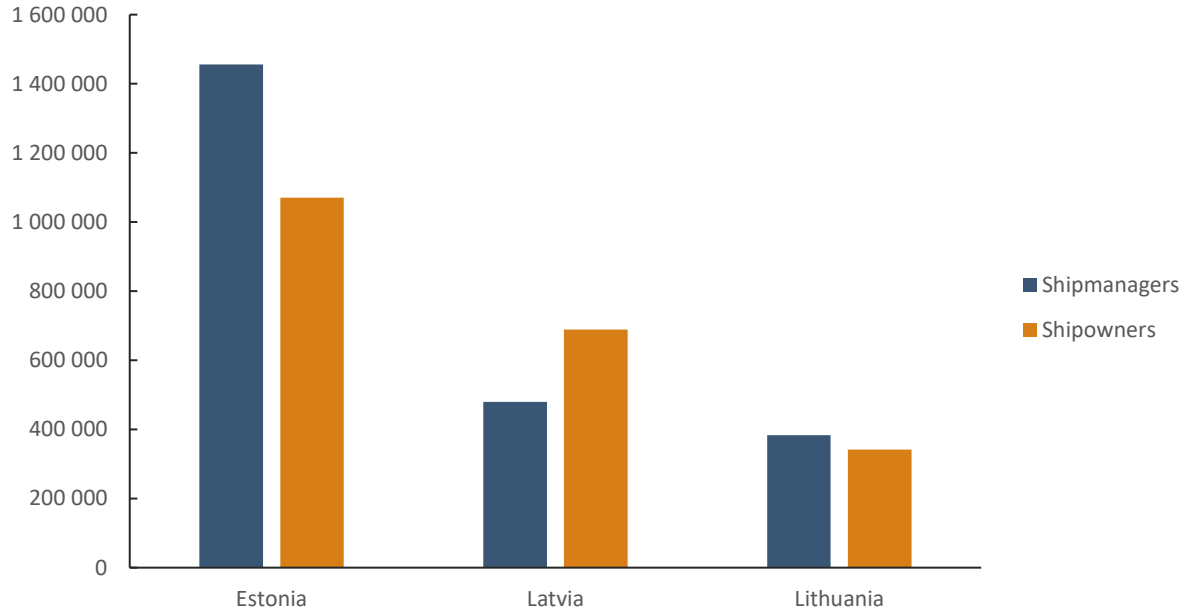
[7] The total value of the Estonian fleet that sails under the Estonian flag gives information regarding the attractiveness of the flag. It is an important measure of the international political landscape of the maritime industry, as the IMO weights the size of the fleet when the different countries in the IMO vote.

[8] This measure tells us how ready the fleet is for the future. Since there are several environmental objectives to be fulfilled in the future, the larger the share of the fleet that is ready for alternative fuels, the more suited the maritime industry in the country is for the future.

According to the Clarksons Fleet Register, there is a total of 52 shipping companies of varying size in Estonia. In total, these 52 shipping companies have a fleet of 165 ships.[9] There are also 25 ships managed by Estonian ship managers. This implies that the total number of ships being owned and/or operated from Estonia is 190.

For an international industry like shipping, ownership and management of companies can easily be split up to take advantage of specialized local competence and cost differentials in different cities. The first indicator, size of shipowners' fleet, measures the size of the fleet in compensated gross tonnage (CGT) that is owned by the *shipowners* registered in Estonia, while the second indicator, size of management fleet, measures the size of the fleet controlled by *ship managers* registered in Estonia. The size of the shipowner's fleet is an important measure because it gives information about the share of the country's economy that stems from the maritime industry. The size of the management fleet describes, in large, the same dimensions as the size of the shipowners' fleet, with one important difference. It gives information about how lucrative it is to be a ship manager in the country instead of a shipowner. Both indicators are interesting on their own, but they are especially interesting when comparing the two. A large shipowners' fleet and a small management fleet indicate that it is not lucrative to operate ships, but that the regulations for owning ships are competitive, and the opposite is true for a large manager fleet and small ownership fleet. The reason for this mismatch in size may be due to framework making it more lucrative to manage ships, but not own them in a country. Examples for such a framework can be the tax scheme for shipping companies or seafarers. As seen in the figure below, Estonia is the largest country in the Baltics measured in CGT for management and ownership of ships, implying that Estonia is the largest shipping country in the Baltics.[10]

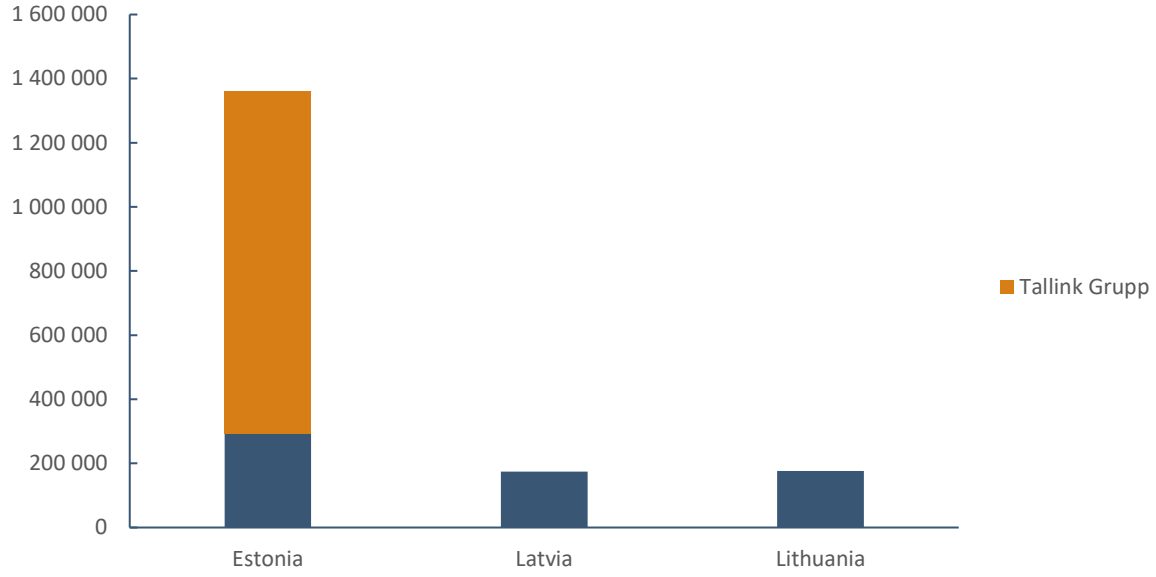
Figure 1 Compensated Gross Tonnage (CGT) for shipowners and ship managers in the Baltic countries. Source: Clarksons World Fleet Register[11]



[9] Note that this includes only ships registered in the Clarksons database, and there may be more ships in Estonia. Talking to actors familiar with the maritime industry, it is estimated that there are about 155 ships larger than 100 GT and an additional 334 ships with GT below 100.
[10] In the figure, if a company both owns and manages their ships, they will be counted in CGT for both shipowners and ship managers.
[11] Note that these CGT correspond with the 165 owned ships and 25 managed ships.

The *total annual turnover* of the 52 shipping companies located in Estonia is an important indicator of the local shipping community's size and importance to the global shipping markets. It is important to emphasize, however, that many shipping companies prefer not to have equity traded publicly and thus tend to keep their financial results hidden from the public to maintain their competitive edge. These facts, coupled with differences in reporting methods and local legal requirements, makes measuring the financial results a challenging task. In total the shipping companies listed in Estonia had an annual turnover in 2019 of 1.362 billion USD.[12] This is mainly driven by the value of Tallink Group, which had an annual turnover of around 1 billion USD. Tallink also had a value added of 443 million USD in 2019, which was roughly 1,5 percent of the total GDP in Estonia in 2019. Figure 2 compares the revenue of the shipping companies in Estonia with the other countries in the Baltics.

Figure 2 Annual revenue of the listed shipping companies in the Baltics. Tallink Group in orange. Source: Orbis



As Figure 2 illustrates, Estonia is the largest shipping community in the Baltics measured in the annual turnover for the shipping companies, also if Tallink Group is excluded from the data. The difference is however significantly larger with Tallink Group included, as Tallink Group holds a very large share of the total annual turnover for Estonian shipping companies.

The Estonian fleet

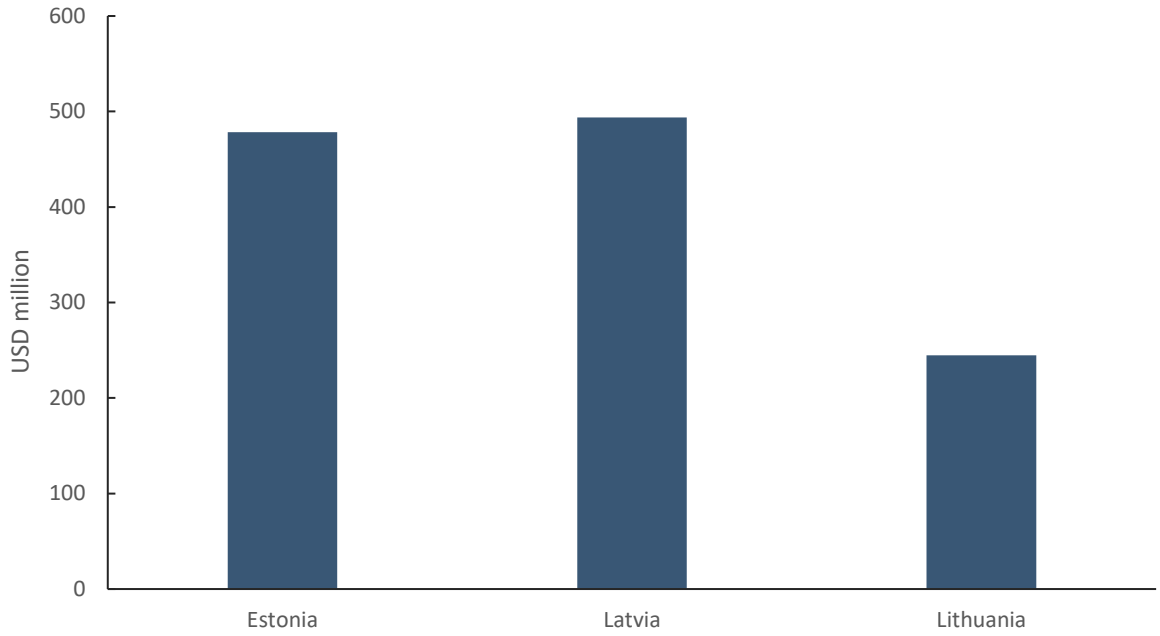
As previously mentioned, Clarksons Fleet Register shows that there is a total of 52 shipping companies in Estonia.[13] The shipping community in Estonia consists of shipping companies either owning or operating ships, or both.[14] There are in total 190 ships managed by Estonian-registered companies, whereas 165 of the ships are under Estonian shipowners' control. The remaining 25 ships are managed from Estonia but owned by a shipowner in another country. The shipping community consists of shipowners delivering a range of different activities, from ferries and cruise ships to general cargo, tugboats, fishing, and ice breaking. Most of the ships

[12] We use 2019 as base year as it is the last "normal" year before the covid-19 pandemic. The pandemic affected one segment of the maritime industry, which is related to passengers, e.g. Tallink Group, enormously.
[13] The Clarksons database determines the nationality of a company based on the nationality of the controlling interest in the group. Furthermore, the subsidiaries of companies are placed in the same nationality as the controlling group in the top level of that group.
[14] One example of this is Tallink Group, which often owns and operates its own ships.

that are active today are listed as multipurpose ships in the Clarksons fleet database. This implies that the shipping industry in Estonia is less specialized and more generalized, where ships serve multiple purposes at the same time.

An important measure when benchmarking a country on the shipping pillar is the value of the fleet owned from the country.[15] As opposed to the size of a fleet, fleet value offers a better reflection of its economic importance[16]. The current state and economic outlook of the underlying shipping segments play an important role in measuring a vessel's value, meaning that if a country's fleet is largely concentrated in a specific segment, then the fleet value will also largely depend on the market state and outlook. For a country that possesses a high ratio of offshore vessels, the offshore markets' state will affect the value of the fleet in that country. This phenomenon is weaker for countries with a variety of vessels in their owned fleet. Figure 3 illustrates the value of the fleet in the three Baltic countries. As seen, Estonia has the second most valuable fleet in the Baltics, slightly less valuable than the fleet of Latvia. This may be due to the value of the ships, and the fact that more complex and valuable ships are registered in Latvia.

Figure 3 Value of fleet for all Baltic countries. Million USD. Source: Clarksons World Fleet Register



Estonia as a flag state

A flag state is a country where a company registers its commercial and merchant ships. The role of a flag state is to conduct regular inspections of each of its ships to ensure the safety of their cargo and crew members. The flag state is also responsible for collecting taxes from the registered vessels and regulating the pollution levels of ships under their flag. In turn, ships must follow any policies enforced by the country that they register with. The ship's flag displays the nationality of the ship and shows under whose laws the ship belongs in international

[15] The fleet value for each city is calculated by multiplying the national fleet value with the city's corresponding national CGT ratio. Estimated by combining data from Clarksons and WFM Vol 9 No 12 December 2018 - estimates of national fleet values.
[16] This evaluation is based on data from Clarksons World Fleet Register with the estimated value of the share of the fleet controlled from the city/country.

waters (Chopra, 2021). Ship registration plays an important role in many aspects such as vessel purchases, newbuilding deliveries, financing, vessel leasing, and different priorities of owners and mortgagees.

Flag states have an important role to play in enforcing IMO rules because they exercise regulatory control (i.e., apply the law and impose penalties in case of non-compliance) over the world fleet on diverse issues, ranging from ensuring safety of life at sea, protection of the marine environment, to the provision of decent working and living conditions for seafarers. In the context of the implementation of the IMO GHG (greenhouse gases) emissions strategy, flag states will have to ensure that ships are compliant with applicable IMO rules. In addition, they could also provide incentives for the ships registered under their flag to reduce CO2 emissions, and potentially play a role when it comes to ensuring the collection of future fees or contributions associated with such emissions (Hoffmann, Rydbergh, & Stevenson, 2020). Shipowners can choose which country they want to register their vessel with, and they are not obliged to register with the country in which they live. Flags of convenience is a term where some states offer tax, port access and regulation incentives to encourage ships to register with them (beneficial tax terms, and thereby lower operating expenses).

One distinct feature of a maritime state is a fleet under its own flag, including cargo and passenger ships engaged in international maritime transport. This is not the case for Estonia today. However, Estonia has a long shipping history, and the picture looked different in the last century. In the second half of the 1930s, Estonia was ranked as number seven in the world in terms of total tonnage of the merchant fleet per 1000 inhabitants. In 1940, the Estonian Maritime Shipping was established. This was one of the major organizations dealing with maritime transport in Estonia during the second Soviet occupation, until its privatization in 1997. After the privatization, the fleet continued to be reorganized and the number of vessels was reduced. Older vessels were sold to be scrapped and the newer ships built after 1990s chose other flags than the Estonian (Estonian Transport Administration, 2021). As of today, there are 58 ships sailing under the Estonian flag. This is equivalent to 30 percent of the total fleet of 165 ships owned by the 52 shipping companies in Estonia.[17] This is shown in Table 3. The table shows the primary operation of the ship in the columns and the flag the ship sails under in the rows. As seen, most of the ships either owned or operated from Estonia are flying a different flag than the Estonian flag, due to better terms under the other flags.

Table 3 Flag state and operation of ship types. Source: Clarkson Ship Fleet Database

Operation/ Flag	Multi-purpose	Tug	Passenger	General cargo	Bulk carrier	Other	Total
Estonia	0	7	16	1	0	34	58
Malta	27	0	0	1	0	0	28
Antigua	11	0	0	2	0	0	13
Madeira	6	0	0	1	0	2	9
Cyprus	4	2	0	0	1	0	7
Other	9	3	2	5	9	22	50
Total	57	12	18	10	10	58	165

[17] The Clarksons database determines the nationality of a company based on the nationality of the controlling interest in the group. Furthermore, the subsidiaries of companies are placed in the same nationality as the controlling group in the top level of that group.

Estonia has for the last ten years been working to enhance the competitiveness of the Estonian flag and the maritime industry. Having few ships sailing under its national flag means that it can be more difficult to ensure the continued development of the maritime sector and to sustain the maritime competence. In addition, Estonia cannot charge register fees for vessels that are not in the register, meaning less revenues for the state from this sector. This is also the case for social taxes, as the social tax is paid in the country the vessel is registered. Furthermore, this also means that Estonian seafarers' possibility to work under the Estonian flag and collect the benefits of the Estonian social insurance is smaller.

The work on enhancing the competitiveness of the Estonian flag started in 2012, with the establishment of an inter-ministerial working group. They started off by identifying the main reasons why shipowners do not choose the Estonian flag. The three main obstacles were (Estonian Transport Administration, 2021):

i. the difficult process of hiring foreign seafarers to work on Estonian-flagged vessels
ii. the ineffectiveness of the Estonian ship registers
iii. the high labor taxes regarding crew members, in comparison with other European countries and the rest of the world.

Since then, the working group has worked to enhance the Estonian flag and the maritime industry's competitiveness, and in July 2020, the "shipping package", a new package of laws, with the goal of bringing more ships under the Estonian flag, entered into force. This introduced changes in the bareboat chartered ships and provided the possibility for shipping companies to opt for special tax regimes, such as the tonnage tax scheme. This legislation included more favorable tax regimes for seafarers and made it easier for foreign shipowners to register ships in the country without having to use Estonian crew. To ease bureaucracy, Estonia offers digital solutions, high cyber security and e-residency to citizens of other countries so they can run Estonian companies from abroad and communicate with the government online (Ministry of Economic Affairs and Communications, 2022).

These measures have however seemed to have had little, if any, effect so far. According to several actors in the industry, the legal framework related to the flag registration is difficult to understand and the information is perceived as not accessible. This makes it difficult for shipowners to evaluate the terms of sailing under the Estonian flag. Furthermore, the process of changing the flag is described as too complex, so there is a need to simplify it. Even though the government has tried to simplify the bureaucracy, having foreign workers approved to work on Estonian ships is still perceived as a complex process. The e-residency was mentioned as a potential incentive to fly the Estonian flag, but the information is not accessible enough, hence there is an insecurity about how it works. Lastly, the tax scheme was described as less favorable compared to other flag states, such as Latvia, which is perceived as more favorable in terms of e.g. tax schemes.

Maritime finance and law

Most maritime services are globalized and often located around ship owning companies. The shipowners' activities stimulate the activity in the rest of the maritime industry through being, presumably, demanding customers. Hence, a country that has a large shipping industry will most likely also have several maritime services providers. This pillar captures development, presence, and efficiency of the maritime law and finance system in the country. This includes eight objective indicators within the legal system and the insurance and financial

system[18]. Ship financing was among the first to globalize, whilst legal services were the least flexible to move across borders due to national jurisdiction limitations. English law firms have been the exception, with branches in shipping hubs across the world, since English law is commonly chosen as the jurisdiction in contracts of trade and chartering.

Overall Estonia ranks number 75 in the LMC 2022 report for the maritime service pillar, as seen in Table 4. This is mainly driven by the high valuation of the shipping companies on the stock exchange, which again is due to the presence of Tallink Group. The table below summarizes the top 5 cities in the world for maritime services and Estonia's ranking. The top 5 cities, New York, London, Tokyo, Oslo and Paris, are all characterized by a large finance industry, or a heavy weight placed on the maritime industry.

Table 4 Ranking maritime services. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**New York**
2	**London**
3	**Tokyo**
4	**Oslo**
5	**Paris**
75	**Estonia**

For Estonia, there is a lack of data on some of these indicators, such as the presence of shipping banks and insurance companies, which affects Estonia's score in the LMC framework. This is also in line with the findings from the interviews, where actors see it as necessary to reach out of Estonia to buy important maritime services.

Legal system

The presence of a developed and specialized legal system is of high importance for a strong maritime industry. The two objective indicators for benchmarking the leading maritime legal centers are the number of legal experts and the number of specialized law firms in the country. There are three maritime law firms in Estonia according to the World Shipping Register[19]: Advokaadibüroo Greinoman & Co, Law Office V Kaasik & Co, and Pandi Balt LTD. This ranks Estonia as number 158 in the LMC data. For comparison, the number of maritime law firms in the leading city in the dataset, London, is 112. This reflects that the framework around the maritime industry is not very developed in Estonia. There is a lack of court precedent due to few cases so far after the country re-gained independence in 1991. This is a source of uncertainty for ship owners and ship managers, as there is too little knowledge about the legal consequences of various incidents and casualties. It will take some time for this to become well established. However, it is like a chicken and egg situation: The more precedent, and the stronger and more consistent the legal framework, the more attractive Estonia will be as a maritime nation. Based on our findings from the interviews, the maritime legal framework in Estonia is seen as hard to navigate in. This is made even harder by the fact that actors describe important information as inaccessible. If there were more specialized

[18] The legal system is rated based on the number of legal experts in the country and the number of specialized law firms in the country. The insurance and financial system are rated based on IUMI insurance premiums, mandated loans, shipping banks portfolio, listed owner groups, market cap for shipping companies and IPO, bonds and follow-ons.

[19] We have also been in contact with TGS Baltic, another maritime law firm operating in Estonia. TGS Baltic is not listed in the World Shipping Register, most likely because it operates in a variety of industries, and its practice extends across the Baltics.

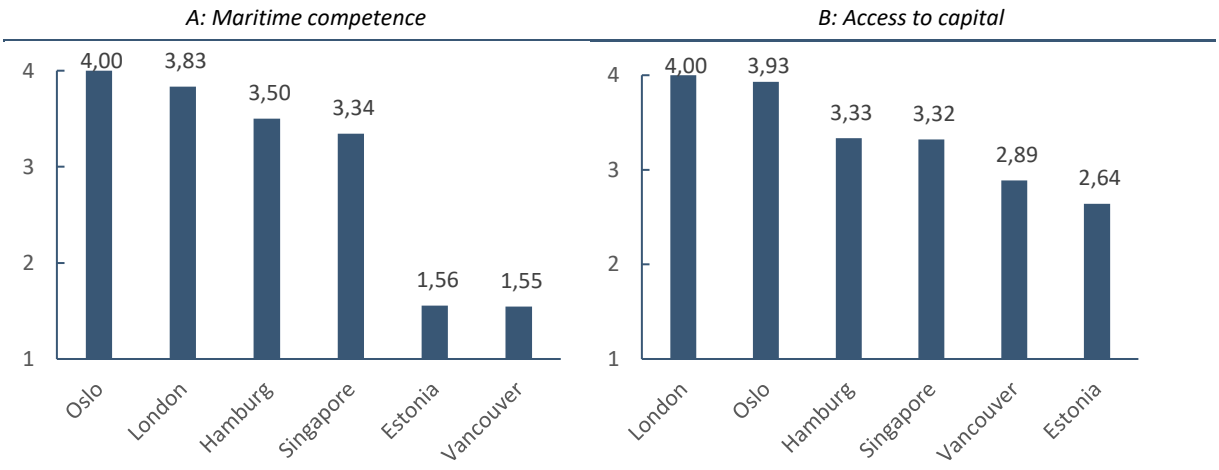
lawyers that could navigate the framework, it might make it more attractive to fly the Estonian flag, due to a more robust legal system.

Insurance and finance

The presence of a well-developed insurance and finance system is also of importance for the maritime industry. This indicator includes an assessment of the volume of mandated loans issued from the financial institutions and companies that provide financing (debt, equity, mezzanine) for the industry, primarily for the sale and purchase of vessels. These companies also include international and investment banks, private equity firms as well as smaller boutiques, which act as arrangers or introducers of capital. Data on the number of listed maritime companies, and volume of traded bonds, IPOs and follow-ons from stock exchanges headquartered in each city was also used as an objective indicator.

There are no banks in Estonia that specialize in the maritime industry.[20] The lack of specialized banks forces actors to use banks abroad to get the banking service they need. This is a process that is described as tedious, even though Estonia is a part of the European Union. The lack of maritime competence among and within the banking and finance providers, e.g. the fact that the banks do not understand how to valuate ships properly when they are approached for loans, means that Estonian actors get lower credit limits when they want to build ships. The actors' perception of the maritime banking system is illustrated in Figure 4 below, illustrating that Estonia is not a leading center of maritime finance. Estonia is scoring particularly low on the specialized maritime competence indicator. Vancouver is the only city that is rated lower in our selection, but the difference is marginal.

Figure 4 A: The banks and financial service providers have highly specialized maritime competence. B: Access to capital (investors, banks, advisors and brokers). Source: Menon Economics[21]



London, Oslo and Singapore are all leading centers of maritime finance, and in this report, we compare with these cities throughout. Singapore is a world leading maritime city – a city that all other maritime cities/countries can learn from. Oslo is the leading Nordic maritime city region and is therefore useful for comparison with other Nordic countries. Hamburg is a strong maritime city in the Baltic Rim (Baltic Sea Region). London is perceived as the European capital for maritime finance. Vancouver is a maritime city region ranked significantly better than Estonia overall (number 17 in total on the objective indicators), but still on a level that Estonia can strive towards.

[20] This means that none of the objective indicators measuring banking activities are represented for Estonia.
[21] This is the average score to the question [Q, where very easy is ranked as 4 and very hard is ranked as 1].

Oslo's strong position in maritime finance is mainly due to Norway's strong historical position in the maritime industry and the development of world leading financial services that have supported this industry (Menon Economics; DNV, 2022). Even though Estonia scores low on both indicators above, this does not necessarily mean that the country needs to build up a maritime financial system in line with Singapore, Oslo and London. However, for the shipping companies to find it more attractive to be located in Estonia, there is a need to increase the maritime competence within the national banks, so the actors do not have to use foreign banks to finance their fleet.

Maritime technology providers

There is generally a demand for specialized equipment in the maritime industry to cater for improved efficiency under sea conditions and to address new operational limitations to comply with recent environmental regulations. Such regulations create niche markets for maritime equipment, from marinized long-life batteries and new designs of engines running on unconventional marine fuels to other solutions for compliance with the upcoming IMO regulations (Menon Economics; DNV, 2022). The maritime technology pillar captures the dimension of whether the maritime industry in the country is on the forefront of the technology in the industry. This includes an assessment of seven objective indicators related to the shipyards, equipment suppliers, maritime R&D and innovative start-ups.

Estonia ranks as number 50 on this pillar, as shown in Table 5, with the maritime education institutions[22] being the indicator with the best score. Singapore is ranked as the world's leading city when it comes to maritime technology, with Oslo and Busan not far behind. When it comes to cities being considered for relocating R&D activities, factors such as local labor costs, quality of life, the presence of advanced educational institutions, and the level of cooperation and information sharing between different stakeholders are all of importance. For Estonia to move higher up on the ranking of this pillar, there is a need for increased investments in maritime R&D projects and the maritime educational system to further develop the maritime industry in Estonia. Furthermore, there is a need to align Estonia's high-quality ICT sector with the maritime industry, as the industry is experiencing rapid technological change. Digitalization, autonomous ships, and maritime cybersecurity are some of the areas needed to further develop.

Table 5 Ranking maritime technology. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Singapore**
2	**Oslo**
3	**Busan**
4	**London**
5	**Shanghai**
50	**Estonia**

[22] The maritime educational institutions in Estonia are Taltech Estonian Maritime Academy and the Estonian Nautical School and. Taltech is a separate institution, a small craft competence center. In addition, there are two training centers: Reval Training Center for offshore, aviation and maritime trainings and Pärnu Maritime Training Center. Lat also provides trainings for motormen.

While not known for its shipbuilding capabilities, Singapore shows a lot of promise when it comes to setting up a framework for maritime R&D projects, as the government is willing to provide support schemes to maritime companies, and especially maritime technology start-ups, that will increase their ease of access to markets, funding, and talent. Oslo, ranked as the world's 2nd leading city overall, is considered one of the prime hotspots for maritime technology and innovation. One of the most important technology companies in the Norwegian cluster is DNV with its head office in Oslo. DNV (est. 1864) is one of the world's leading maritime R&D companies, investing 5 percent of its revenues into new technology development, as well as the world's largest ship classification society according to Lloyd's List. In third position is Busan, thanks to its big fleet size (CGT) delivered by its shipyards, the market value of the ships built there, as well as leading in the number of patents produced by the maritime firms headquartered in the city. London scores greatly from its prestigious maritime education institutions and for being the home of the oldest classification society with a history from 1760, Lloyd's Register. Shanghai closes the top 5 list, driven by the presence of its modern shipyards with major newbuild projects gravitating towards them (Menon Economics; DNV, 2022).

The shipbuilding industry

At shipyards, the demands from design and industry standards are put into action. Modern ships are a mosaic of parts from numerous subcontractors that become high-tech industrial assets for their owners. Assembling ships is a technologically and logistically demanding operation. Some shipyards build the entire ship in one location. For more technologically advanced ships, it is common for hull construction to occur in low-cost countries before outfitting is done in countries with more highly skilled and costly labor. Shipyards are often surrounded by maritime equipment companies that supply them. In the last two decades, Asian centers have been rapidly growing in strength, so that nowadays they are responsible for more than 92 percent of the global CGT output. Focusing on the shipbuilding activities in 2019-2021, South Korea, China and Japan have been the main beneficiaries of this trend, gathering around 88 percent of the global output, cumulatively. European centers have been struggling to keep up with the competition and have largely shifted their focus to more niche and sophisticated markets, such as cruise ships, complex offshore vessels, and navy ships (Menon Economics; DNV, 2022).

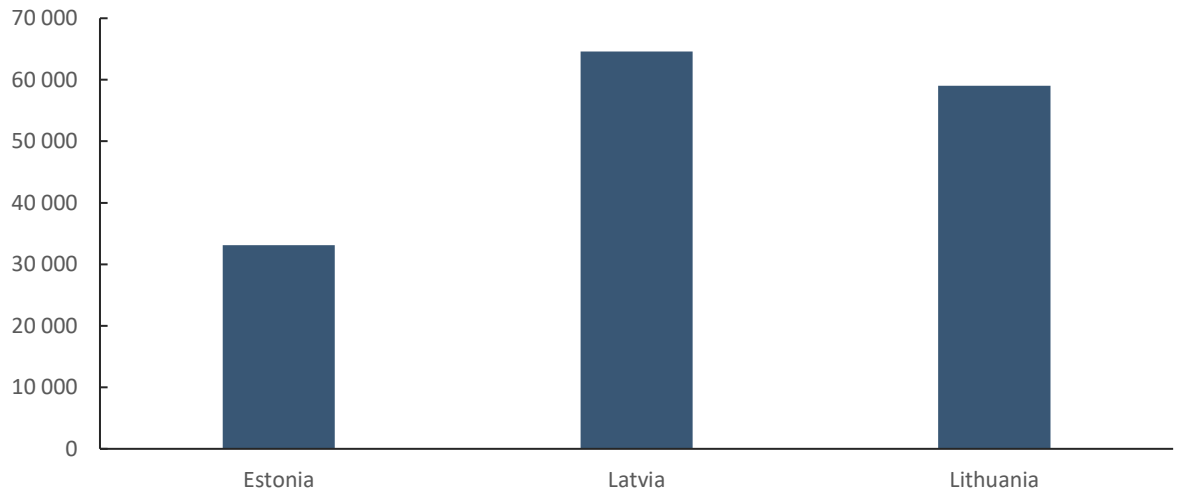
To assess the shipyards in Estonia we look at two central indicators. The first indicator is the total CGT (compensated gross tonnage) built by shipyards in Estonia and the second indicator is total CGT built with ships that are ready for alternative fuels at the shipyards in Estonia. CGT is a unit of measurement intended to objectively reflect the relative production capacity in various shipyards and in different regions of the world. It refers to the comparative work content inherent in building a ship and is an indicator of work content or the capacity in shipbuilding (European customes portal, 2019). As seen in Figure 5, Estonia has the smallest shipbuilding industry in the Baltics measured in total CGT.[23] The Latvian shipbuilding industry is the largest, measured in CGT, closely followed by Lithuania. It is however important to mention, that Estonian shipyards also have yards in other countries meaning that the CGT will be registered there and not in Estonia. An example of this is BLRT Grupp has subsidiaries in other countries, such as a ship repair yard in Lithuania and a repair yard in Finland (BLRT, 2023).

According to interviews, the difference illustrated in Figure 5, is mainly due to the variations in cost level in the different countries. Latvia and Lithuania have a comparatively cheaper labor force, and the labor-intensive

[23] *The picture looks the same when using gross tonnage (GT) as a measure. However, when looking at the ratio CGT/GT, the value is higher for Estonia compared to Latvia and Lithuania, meaning that the ships built at Estonian shipyards are more complex/require a higher work content.*

shipyard industry is therefore larger in these countries. However, some countries with higher cost of labor are competitive with Latvia and Lithuania. Norway for example has a larger and more developed shipyard industry, despite the high cost of capital.

Figure 5 Total CGT built at shipyards in the Baltics. Source: Clarksons World Fleet Register[24]



As sustainability becomes a greater priority in the maritime industry, shipyards start to capitalize on design and manufacturing innovations to produce low-carbon-emission ships. As shipyards worldwide iron out their strategies on how to improve their competitiveness and try to find an innovative approach that will differentiate them from competitors, Busan's shipbuilders are already accelerating their efforts, viewing this trend as a new business opportunity. At the national level, South Korea continues to invest billions of USD into eco-friendly and smart ship technologies, managing to gain ground against China and Japan (Menon Economics; DNV, 2022). Even though Estonia is a smaller shipbuilding country than Latvia and Lithuania, as seen in Figure 5, Estonia is the only country in the Baltics that has built a ship ready for alternative fuels as of today.

The maritime technology industry

To have a thriving maritime industry, the supplier side is a key part of the value chain. The suppliers in the value chain can be an engine for innovation and R&D in the industry. This in turn can lead to a stronger maritime industry and development of the domestic shipowners and shipyards, as well as ensuring the export of goods and services to other countries. The actors in the industry, through the survey and interviews, were asked to consider the technological milieu in Estonia, as seen in Figure 6. The maritime suppliers' technological level is perceived as relatively low among the actors in the industry. They are ranked slightly higher on the technological development indicator. In the interviews it was mentioned that there are few specialized suppliers, and to get the technology needed it is necessary to go out of Estonia to buy the goods and services.

[24] This measure is the size of the fleet (CGT) delivered by shipyards in the countries, including orderbook and ships built later than 2018. Fleet size per yard distributed to the city location of the shipyard. This is the pillar used in the LMC report.

Figure 6 The maritime suppliers in the region hold a world-class technological level (x-axis) and the companies in this city/country are in the forefront of technology development in the maritime industry (y-axis). Source: Menon Economics[25]

Technological development

The maritime industry is on the verge of important changes driven by a sense of urgency in terms of the climate crisis and increased efforts to cut emissions by regulatory bodies. This will challenge the existing business models, but also offer new opportunities. The level of technological adoption varies between the sectors. The maritime industry is lagging compared to other industries, in the proliferation of digitalization in the entire scope of maritime transport and services. It is currently most pronounced within the shipping segment related to vessel navigation systems and in streamlining cargo handling operations, including cargo optimal routing, monitoring, warehousing, and use of AI-powered algorithms for optimized stowage plans for container ships. Such maritime digital transformation causes fundamental organizational changes in traditional business practices through the implementation and use of digital technology, redefining existing business capabilities, processes, and relationships, and thus new possibilities are enabled, and value is created, captured and delivered (Tijan, Jovic, Pucihar, & Aksentijevic, 2021). Crucial for the success of digital transformation is the alignment between both the business and digital strategies as well as the acceptance of involved players (port administrations, shipowners, shippers, service providers) to cooperate. On the other hand, the main barriers for digital transformation appear to be the high initial implementation costs, low quality of offshore internet connections, aging decision-makers, and the lack of investment initiatives and risk aversion especially due to the uncertainty sentiment induced by the covid-19 pandemic.

Estonia has been determined to build a strong and world class ICT industry. There seems to be a huge potential for stronger collaboration and indeed integration with the maritime industry, an industry that is facing immense needs for digitalization, which is also essential for decarbonization. Aspects such as autonomous ferries, sensors and internet of things, digital twins and other technologies will be central in the future (Menon Economics, 2022). To be successful in developing this kind of technology, a cooperation between the maritime industry and the ICT

[25] *To what extent do you agree to the following statements:* The companies in this city are in the forefront of technology development in the maritime industry *and* the maritime suppliers in the region hold a world-class technological level.

industry is essential. The ICT industry needs to develop technology that the maritime actors need, this requires communication and an understanding for what both sectors are trying to develop. Furthermore, the maritime actors need to be available for testing of these new maritime solutions.

Entrepreneurship is one of the key drivers of economic growth and development and is used to assess a city's relative attractiveness and competitiveness. The Global Entrepreneurship Index was selected to evaluate the health of the entrepreneurship ecosystem in each location which was further complemented by the results from the experts' assessment. The objective rank measures a series of entrepreneurial indicators. It puts weight on the framework for entrepreneurship, educational system etc. Estonia ranks as number 22 in this index. These results imply that Estonia is a good place to be an entrepreneur. However, it is important to note that this is not specific to the maritime industry, but to entrepreneurship. Another measure for innovation is the number of patents. Estonia is listed with 22 maritime patents in the Orbis Intellectual Property database. This shows that the maritime industry in Estonia has certain inventions, but the number is not very high.

Ports and logistics

The increasing size of modern cargo ships and increasing world trade puts pressure on ports to become larger and more automated. All around the world, ports are constantly being upgraded and modernized to lower the cost of transportation and be more competitive. The shipping industry's ability to deliver reliable logistics services at a low cost is a prerequisite for the modern world economy. Many companies rely on supply chains that stretch over vast distances, even continents. It is important for cities that companies can use them as hubs for carrying out complex, highly specialized logistical services (Menon Economics; DNV, 2022).

Access to ports and logistics is essential for a well-developed maritime country. The more developed the logistics in the country, the easier it is for foreign ships to dock and deliver to these ports. This pillar assesses the ports and logistics in a city/country by using four objective indicators, TEU in port, Size of ports operation, Line Shipping Connectivity Index (LSCI), LNG available at ports. As seen in Table 6, Estonia ranks relatively low on this pillar, which is their lowest rank of all the pillars. This is due to the relatively low amount of TEU in the ports compared to larger ports in other nations.[26]

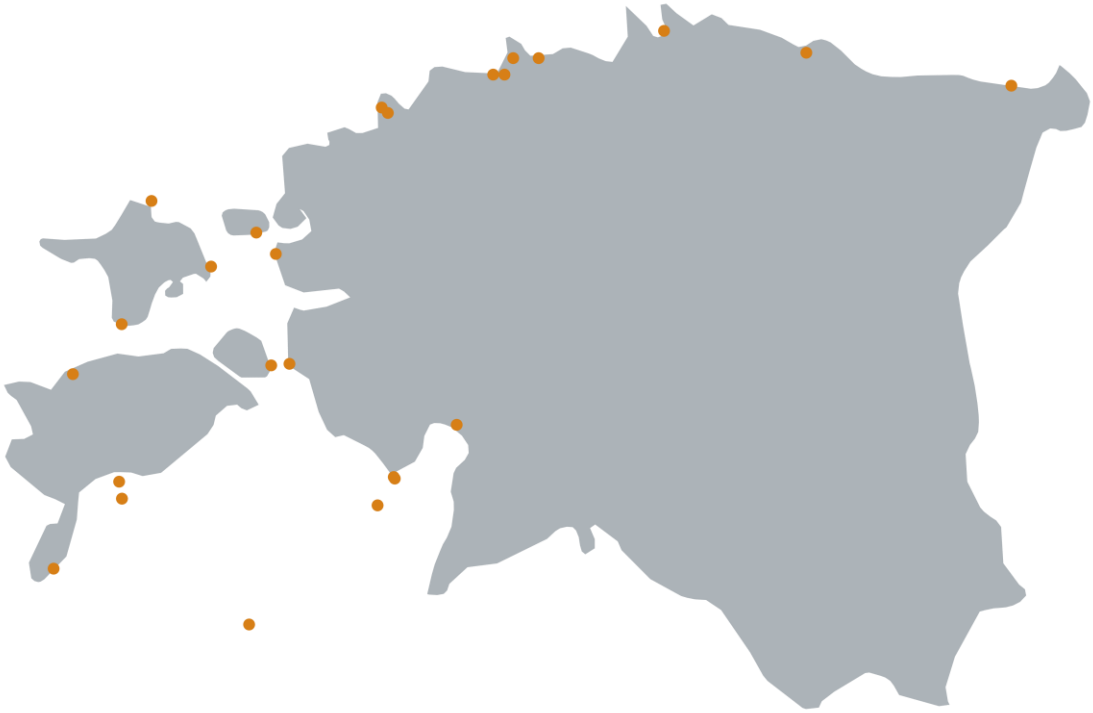
Table 6 Ranking ports and logistics. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Shanghai**
2	**Rotterdam**
3	**Singapore**
4	**Hong Kong**
5	**Guangzhou**
217	**Estonia**

[26] In comparison, Stockholm is ranked as number 275, Helsinki as 302 and Riga as 282. It is however important to have in mind, that their ranking would be different, especially for Riga, if the ranking was at a country level.

There are 236 ports in Estonia as of 2023, located along the coastal line. Figure 7 illustrates the 26 main ports, with Port of Tallinn, Muuga Harbour and Port of Paldiski being the three largest ports according to Bansar.[27] The main advantage of the Estonian ports is that the ports work as a gateway into the European continent from the Baltic Sea.

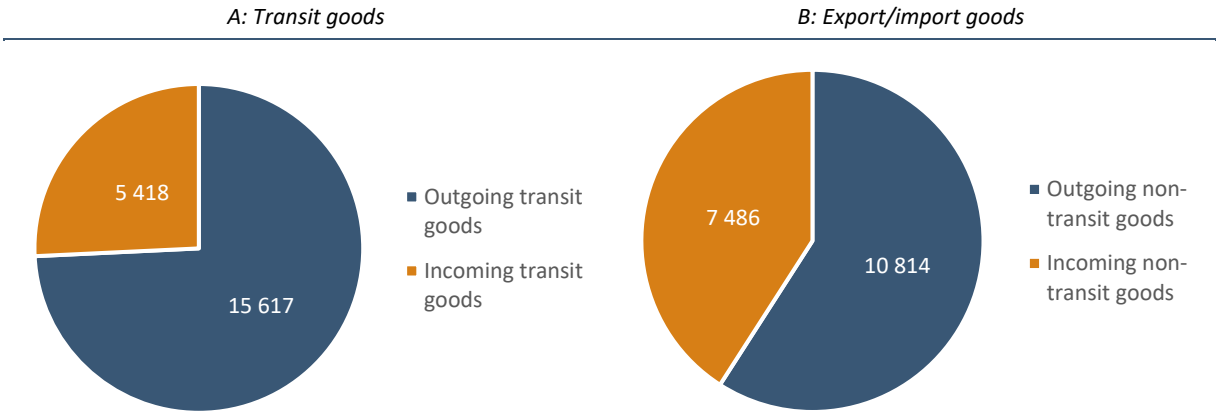
Figure 7 Estonian ports in orange. Source: Estonianports.com



In 2021, a total of roughly 40 million tons of cargo was handled in the Estonian ports, where 53 percent of the cargo was transit goods, while the remaining cargo was import and export of goods (non-transit goods). This is illustrated in Figure 8. The fact that more than half of the cargo handled in Estonian ports consists of transit goods illustrates the importance of Estonian ports for the surrounding countries, working as a gateway for East European countries to the global market. According to Andmebaas statistics, the transit cargo in 2021 was mainly coke and refined petroleum products and chemicals. The main export cargo (outgoing non-transit cargo) was agriculture, wood and grouped goods, while the main imports cargo (incoming non-transit cargo) was grouped goods and mining and quarrying products.

[27] *Largest 30 Ports in Estonia - The Complete List (bansarchina.com)*

Figure 8 A: Transit goods. Divided into outgoing and incoming goods. B: Export/import goods. Divided into outgoing and incoming goods. Measured in thousand tonnes of goods. Source: Statistics Estonia



One key element about the ports is that the transit ports are more exposed to competition from other countries. Since the transit ports stand for about 53 percent of the total cargo in 2021, it is important to be aware of the competition from surrounding countries. This is because the transit ports are heavily dependent on other countries' industry, such as for example Russia.[28] Since Latvian ports are close to the Estonian ports, it is possible for actors to change ports with low transaction costs. This implies that the transit ports need a comparative advantage compared to their neighbors. This comparative advantage may be their prices, but also other aspects such as surrounding infrastructure and efficiency at ports may give the Estonian ports the advantage that is needed.

Port(s) with varied and advanced logistics services increase the attractiveness of the country because it will help the ships to operate in the best way possible. There are several ways in which a port can increase its attractiveness, e.g., the port can offer bunkering possibilities for alternative fuels, advanced technological solutions to make the port more efficient etc. A study by the OECD concluded that well-run ports produce many economic benefits such as lowering the cost of trade, increasing value creation, job creation and attracting related maritime services. To get the best economic benefit from port operations, port cities must facilitate an increase in the maritime service offering and take advantage of possible spill-over effects for industrial development (Menon Economics; DNV, 2022). The connection between ICT-developments and developments in the Estonian maritime industry will be significant in the ports and logistics sector. Several interview subjects mark port digitalization as a crucial point, along with autonomous ships. As Estonia is a forward-leaning country in terms of ICT solutions, they can benefit from better implementation of these solutions in the maritime industry. Port of Tallinn has already digitized a part of its port operations related to the driving of cars onboard the ships. Instead of having physical payment and registration of the cars, the vehicles (trucks and cars) are filmed and automatically recognized based on their license plates. Furthermore, a digital twin is made and uploaded to the booking system to confirm that the booking matches the actual vehicle, to ensure that there is enough space on board. This makes the process more efficient.

[28] *Note that due to the ongoing Russian war in Ukraine, the cargo going through these ports has experienced a massive decline since last year.*

With the IMO's ambitious goal of reducing GHG emissions from international shipping by 50 percent by 2050 and phasing them out before 2100, one of the GHG strategy requirements is the Carbon Intensity Indicator (CII). CII addresses actual emissions of vessels in operation and will be assessed annually from 2023, with year-on-year stricter emission limits. A vessel can reduce its CII by a combination of measures, including use of alternative fuels. Ports around the world are thus looking into onshore power capabilities and offering alternative fuels such as LNG or other low-carbon fuels, to cater for the refueling demands of vessels calling there. Note that this benchmarking indicator is expected to include other low and zero carbon fuels, as they gradually will become commercially available in ports (Menon Economics; DNV, 2022). Port of Tallinn is the largest port in Estonia and offers a wide range of services. The port has available LNG for ships, and onshore power connection for regular ferries in 5 quays in the old city. They are also looking into solutions for onshore power for cruise ferries, but there are currently infrastructure problems that make this challenging. In addition, Port of Tallinn (Tallinna Sadam) has decided to invest up to EUR 53 million to extend its port area to support the construction and maintenance of offshore wind farms in the Baltic Sea region (Memija, 2022). In February 2023, Port of Tallinn and Utilitas Wind signed a Memorandum of Understanding with the aim of accelerating the development of offshore wind energy in Estonia and the Baltic States. Cooperation in the development, construction and maintenance of offshore wind farms will enable new business opportunities while developing local expertise (Baltic Wind, 2023).

Attractiveness and competitiveness

The more attractive a city/country is, the stronger is its (future) growth potential. Cities/countries must be regarded as attractive by their incumbent companies for the city to retain them, and by external companies to be attracted to them. Cities/countries are complex economies with a range of factors that impact the decision-making process of a business to stay in an existing location or to move to a new one. Hence, industry experts' judgement and objective indicators related to proximity to key customers, presence of competitive suppliers, living conditions, competitiveness of maritime companies as shaped by cities' cluster dynamics and public policy were used to benchmark the maritime industry in Estonia in this study.

To rate how attractive and competitive Estonia is as a country, the country is ranked based on three objective indicators and a series of subjective indicators. The objective indicators capture the important aspects of geographical closeness to the market the actors are operating in and access to competent workers. Further, it is rated based on the questionnaire and interviews with actors in the industry. Estonia ranks as number 19 on the attractiveness and competitiveness pillar, the highest score among the five pillars. This is mainly due to the ease of doing business and the neutral tax code, which promotes sustainable economic growth while simultaneously allowing for sufficient public income. Singapore remained the most attractive and competitive maritime city in the world in 2022. Table 7 summarizes the five most attractive cities and the rank of Estonia.

Table 7 Ranking attractiveness and competitiveness. Source: Menon Economics; DNV. (2022)

Overall rank	Country
1	**Singapore**
2	**London**
3	**Copenhagen**
4	**Rotterdam**
5	**Oslo**
19	**Estonia**

Even though Estonia scores high on this pillar, the industry lacks a strong maritime cluster, which is important for the development of the industry in the country. Furthermore, Estonia scores mediocre on the subjective indicators related to proximity to key customers and the presence of specialized and competitive suppliers. This indicates that the cluster is far from complete, or, phrased differently, it indicates that there are significant holes in the value chains. Estonia is ranking high on the ease of doing business pillar and is also ranked in first place in the OECD International Tax Competitiveness Index Rankings, as it has been for the last nine years. Even though the country has several maritime educational institutions, the actors in the maritime industry in Estonia express that there is a lack of relevant competence in the industry and in the country.

The importance of a strong maritime cluster

Over time, the attractiveness of a city or country is gradually shaped by the dynamics of the industry. In an industry with strong cluster dynamics, knowledge is continuously improved and dispersed, upgrading both companies and resources. Maritime clusters have an important impact on the development of a regional industry, as they can enhance social and economic benefits and innovation within a region. In the early 2000s, the EU launched an integrated policy report for maritime-related issues with a focus on cluster concepts. Since

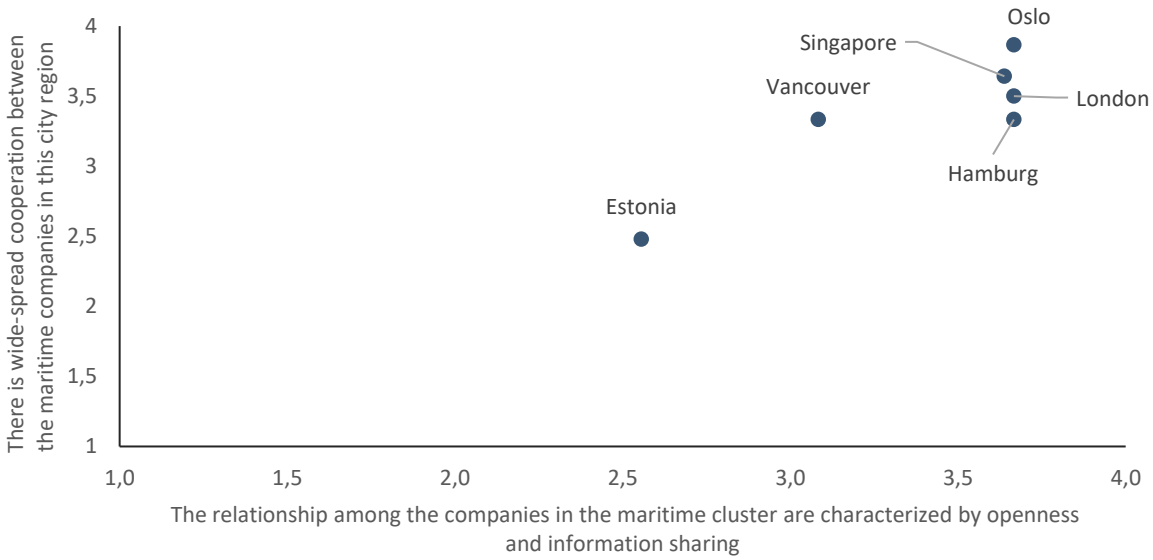
then, the cluster concept has been an important way of analyzing economic developments and planning future strategies, both for the members of the cluster and also in relation to policymaking. The cluster concept has however been interpreted differently among actors across different industries and within the same industry, and there have been several different definitions of what a cluster is (Nommela & Kaare, 2021). Michael E. Porter defined clusters as a *geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. The geographic scope of clusters ranges from a region, a state, or even a single city/country to span nearby or neighboring countries.* Another definition, such as Porter's, is that a cluster is *a group of companies or organizations that are connected by geographic closeness and operate in similar fields,* while a third one defines a cluster as *a group of industries that are directly and indirectly related to shipping and situated within a certain geographic area*.

Most maritime clusters owe their existence to the city's/country's past success in its role as regional port/hub of commerce. But this is not enough, as proven by cities with a declining maritime footprint, such as San Francisco, Naples, Liverpool, and New Orleans, due to decreasing demand for traditional port services amid fierce competition (Merk, 2013). On the other hand, the operators of the Singapore maritime cluster successfully maintained their cluster's relevance by modernizing their capacity/country to accommodate increasingly large ships and high cargo volumes and to offer complex, highly specialized logistical services, while catering to specialized needs for maritime finance, insurance, bunkering and other value-added services (Menon Economics, 2017). Local governmental entities and maritime associations have greatly contributed to that effect by adopting and implementing pro-business policy measures, as well as continuously seeking input and feedback from industry actors, for Singapore to remain an attractive location for maritime business establishments.

The Estonian maritime industry is characterized by several actors, with no overarching binding element. The Maritime White Paper 2022-2035 (Ministry of Economic Affairs and Communications, 2022) has classified the different sub-clusters of the Estonian maritime industry based on the types of business activity involved: shipping, ports, fishing and aquaculture, marine industry (which consists of marine technology and electronics, and ship repair and maintenance), hydraulic engineering and dredging (which includes port engineering and information systems), energy, recreational and leisure boating, maritime services and intermediary activities, and maritime ICT sector and cyber security. There are three organizations that for some are defined as clusters, namely the Estonian Shipowners Association, Estonian Ports Association, and Estonian Transit and Logistics Association. There is however a need, according to the actors in the industry, for an overarching umbrella organization that can unite the three associations and other actors to provide legitimacy to the political agenda of the industry. Further on, it was mentioned in the interviews that the industry lacks the ability to see the big picture, focusing on their needs today but not thinking ahead. To ensure the development of the maritime industry, there is a need for the actors to align their overall agenda with regard to attracting the relevant competence, retaining the number of Estonian seafarers and strengthening the Estonian flag.

According to the actors in the industry, the level of trust between the actors is good. There is, however, an issue related to people having different roles. A person working in a company might be representing the company one day and then an organization or the union another day. As seen in Figure 9, the cooperation between the maritime companies in the country is perceived as mediocre. The same accounts for the openness and information sharing between the actors. This means that the basis for establishing a more united cluster is present.

Figure 9: A: There is wide-spread cooperation between the maritime companies in this city region/country. B: The relationship among the companies in the maritime cluster is characterized by openness and information sharing. Source: Menon Economics, 2022



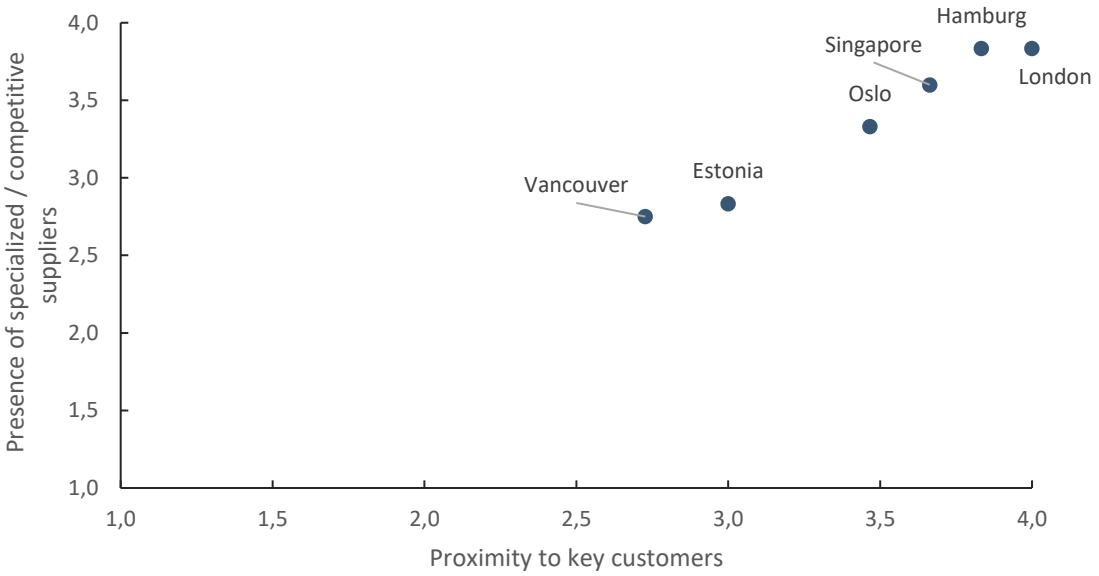
Estonia's attractiveness as a maritime nation

It is important to have a clear opinion about how attractive Estonia is viewed as a maritime nation. We assess this by looking at a series of indicators that are important for maritime companies when they consider where to locate themselves. These indicators are the proximity to customers and suppliers and the access to world class competence, which are estimated based on answers from the questionnaire sent to Estonian maritime industry players.

Proximity to customers and suppliers

Proximity to large and demanding customers and the presence of specialized/competitive suppliers are both drivers of competitiveness. For the maritime industry in Estonia to prosper, two conditions must be satisfied: The companies must be competitive, and Estonia must be attractive as a host for these companies. These two conditions are mutually dependent: the companies gain their competitiveness from resources available in Estonia – for example through access to capital, talent, and specialized supplies – and the price they must pay for these resources. Accordingly, the attractiveness of Estonia increases when competitive companies are present in the country. Hence, the clue is to attract the winners. As seen in Figure 10, Estonia scores mediocre on the subjective indicators related to proximity to key customers and the presence of specialized and competitive suppliers. This indicates that the cluster is far from complete, or phrased differently, it indicates that there are significant holes in the value chains. We also observe that the proximity to key customers is ranked higher than the presence of specialized/competitive suppliers. This is particularly true for shipping companies. These companies give a quite low score on the competitiveness of their suppliers in Estonia, while they perceive the proximity to key customers as somewhat better.

Figure 10: Proximity to key customers (x-axis) and presence of specialized/competitive suppliers (y-axis). Source: Menon Economics, 2022



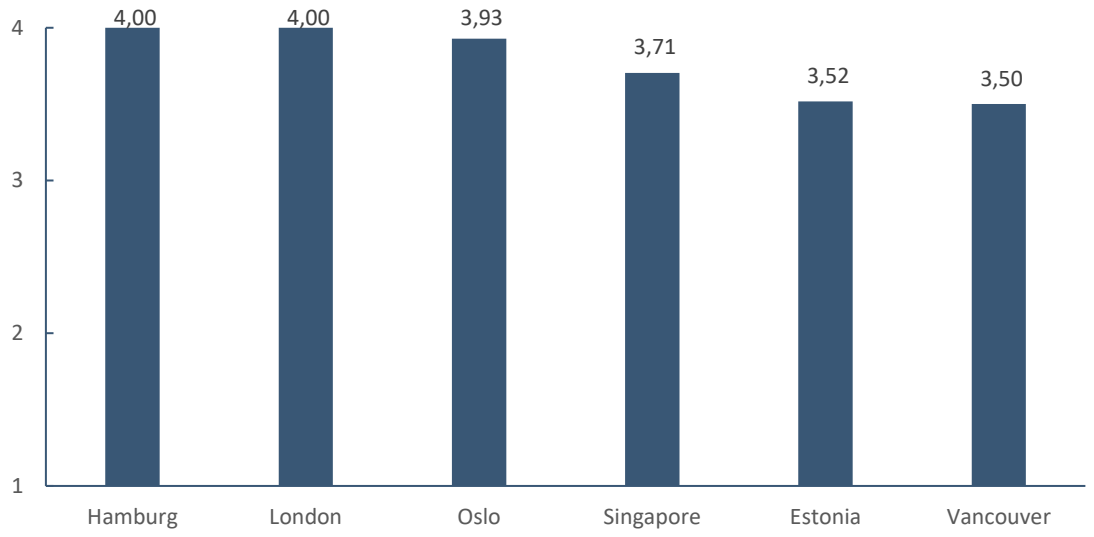
Access to and availability of competence

Access to relevant competence is one of the key barriers against continued growth for maritime companies worldwide. To attract and retain a relevant and competent workforce it is vital to be an attractive and competitive industry. The actors in the maritime industry in Estonia express, through the questionnaire and the interviews, that there is a lack of relevant competence in the industry and in the country.

Estonia has a small working population, and the maritime industry's war on talent includes competing with the prosperous and popular ICT industry, as has already been mentioned. As in many countries, the shipping and maritime industry is seen as unattractive by many young people, including students. This low image can in many cases be improved by storytelling: showcasing the many various jobs available in the industry and how global it is, especially the deep-sea part of it. In Norway there are various initiatives in place like the Maritime Trainee program, aimed at graduates with a master's degree, offering a land-based career, and Maritime Career, an initiative aimed at recruiting young people to a career at sea – however with the prospect to transfer to a land-based career later.

Another important aspect of the attractiveness of the maritime industry in a country is the living conditions. The living conditions in Estonia are rated as very good, being competitive with all the other countries shown in Figure 11. In the interviews Estonia is described as a great place to live and the actors do not perceive it as difficult to attract foreign workers. However, it is perceived as a complex process to register foreign workers in the country. In addition, it was mentioned that due to the fact that foreign workers often are employed on temporary contracts, it is more challenging to attract them to the country. Furthermore, inflation has increased in recent years, and it is expected to reach 15-20 percent this year (2023). This is very high even compared to neighboring countries – the corresponding number for Finland is about 5 percent. One consequence of this is that the wage gap between Finnish and Estonian seafarers is about to close, which may make it even less desirable to hire Estonians compared to Finnish crew. This was mentioned as a problem by some of the interviewees.

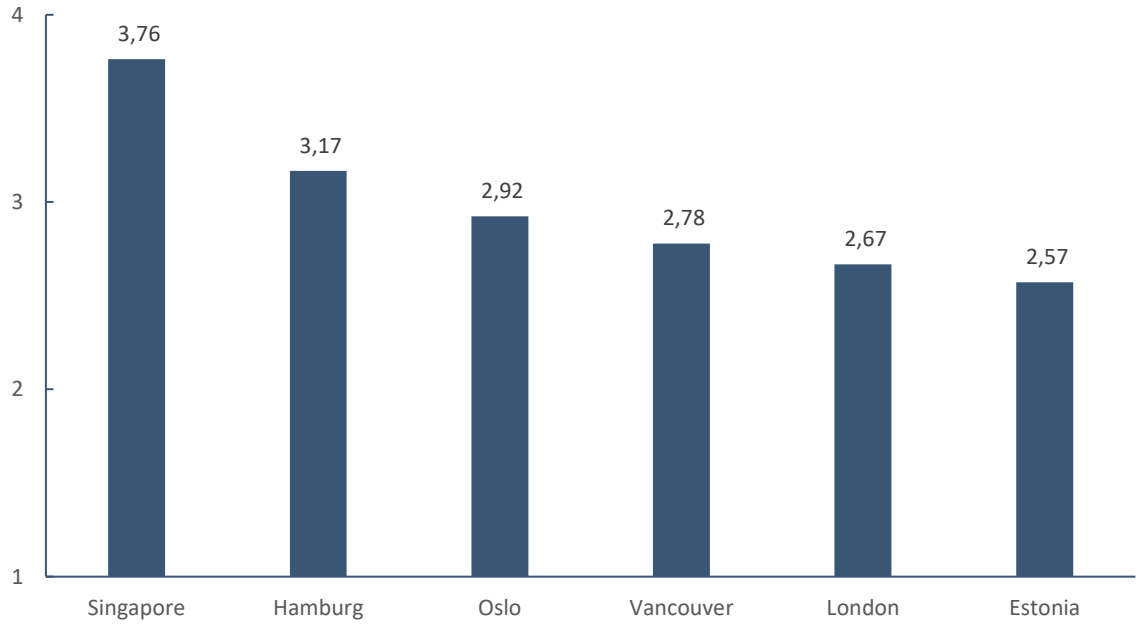
Figure 11: Question from survey: Taking all living conditions into consideration, this city/country is a good place to live and work for a family. Average score, range between disagree (1) and agree (4). Source: Menon Economics, 2022



Public policy

The maritime industry is international in nature, and this makes competitive regulation important for cities to attract and retain business. Both maritime specific regulations and the overall regulatory framework for conducting business are important in this regard. Governments play a central role in defining the attractiveness of a city or a country. Through various public policy factors like taxes and subsidies, they determine the price of capital, labor and other input factors. The quality of the resources is to a large extent determined by investments in infrastructure, education and R&D (Menon Economics; DNV, 2022). The policy framework in Estonia, meaning an overall assessment of taxes, incentives and regulations, is perceived as mediocre by the actors in the industry, as shown in Figure 12.

Figure 12: Policy framework – overall assessment of taxes, incentives and regulations. Source: Menon Economics, 2022



Doing business in Estonia

While it is difficult to measure maritime specific regulations on a global scale, the Ease of Doing Business Index developed by the World Bank gives an insight into the wider set of regulatory environments. A higher ranking indicates better, usually simpler, regulation for businesses and stronger protection of property rights. Empirical research indicates that the impact of improving these regulations on economic growth is strong (Menon Economics; DNV, 2022). Looking at the maritime cities studied, small city states perform very well on the index, with Singapore and Hong Kong the top two performers. Estonia has a score of 80.6, which is the 18th highest in the dataset. Singapore ranks 1st, representing a competitive, growing economy, where incorporating a company takes only a short amount of time, is available at a low cost, and the process is largely digitized. It maintains a flat corporate tax rate of 17 percent, making it one of the lower corporate tax rates in the world. In comparison, Estonia's corporate tax rate is generally a flat 20 percent, calculated as 20/80 from taxable net payment (Republic of Estonia, 2023). Undistributed and reinvested profits are exempt from income tax.

However, from the interviews it has become clear that the maritime actors think it is hard to conduct business in Estonia. The political climate has made it hard to have a consistent long-term plan for maritime business, because changes in political parties may affect the maritime industry significantly. Furthermore, the maritime actors would prefer to have one political person or ministry that speaks on behalf of the entire maritime industry. According to several of the interview objects, the lack of one consistent political role is the largest problem for the industry, be that a dedicated minister or a complete ministry.

Tax system

Estonia is ranked in first place in the OECD International Tax Competitiveness Index Rankings, as it has been for the last nine years. The country has a neutral tax code, which promotes sustainable economic growth while simultaneously allowing for sufficient public income. Maritime companies in Estonia can choose between different taxation schemes. The general tax system has a corporate income tax which is only applied to distributed profits. The other option is the tonnage tax scheme[29], which applies to profits earned from goods and passenger transport by sea. Taxes are calculated based on net tonnage of the vessels at the company's disposal. The income tax rate is 20 percent, and the social tax rate is 33 percent. Companies that employ seafarers can also apply for a special tax regime that offers more favorable tax conditions for crew members[30]. The social tax of 20 percent is applicable to the employee's monthly remuneration which for crew members is up to 750 euros per month of employment if such remuneration is for employment on a ship meeting the criteria in paragraph 13 (5) of the Income Tax Act[31] (Estonian Tax and Customs Board, 2023). The special tax regime for crew members is a labor tax incentive available to Estonian resident companies such as shipowners and persons providing

[29] The tonnage tax scheme is a specialized tax regime available to companies operating ships under the Estonian flag. Under this scheme, the company's tax liability is calculated based on the net tonnage of the vessel and the profit earned from the transport of goods and passengers by sea, with no consideration given to the company's actual earnings. To qualify for the tonnage tax scheme, the ship must meet the scheme's criteria, and its operator or owner must generate income from core, ancillary, assistive activities or international carriage of goods or passengers by sea.

[30] Crew members are not subject to compulsory health insurance, meaning that the employer is exempt from paying the health insurance component of the social tax – 13 percent. Crew members are free to enter into a voluntary health insurance contract with the Estonian Health Insurance Fund. Permanent residents and persons living in Estonia under a temporary residence permit or with right of residence may enter into such a contract.

[31] The remuneration paid to crew members is subject to income tax at the rate of 0 percent if the remuneration was due for employment on a ship which (i) has a gross tonnage of at least 500 and is used for international carriage of goods and passengers at sea within the meaning of paragraph 52 (5) of the Income Tax Act, except passenger ships engaged in regular service in the EEA, and (ii) flies the flag of a Contracting State. The income tax rate of 0 percent is not applicable to income from employment on passenger ships engaged in regular service in the European Economic Area, including cruise ships (Estonian Tax and Customs Board, 2023).

technical ship management or crew management services, as well as non-resident employers operating in Estonia or with a permanent establishment in Estonia (Republic of Estonia, 2023).[32]

Despite the tax incentives available, the actors in the Estonian maritime industry have identified several areas that require improvement to enhance the sector's competitiveness. Ship builders have suggested that revenue taxes should be directed towards developing the industry, while shipowners are seeking a more stable taxation system. Information on taxation and fairway dues is thought to be unclear and inaccessible, and the tax system is perceived as a source of conflict. The current system of fairway dues is considered too high, with reductions negotiated periodically, leading to ineffective allocation. While the money collected from these dues is earmarked for innovation, several stakeholders believe it should be reinvested in the industry. To stay competitive, Ports and Logistics providers are seeking low railway tariffs as the railway is a state enterprise.

To address these issues, stakeholders have called for a clearer tax system, and tax breaks to make them competitive. There have also been calls by shipowners to extend the tonnage tax to management companies to encourage them to stay in Estonia. Finally, there have been calls for more liberal labor laws, allowing more foreign workers to work in the maritime industry. Shipowners have suggested that foreign workers should not be subject to social tax, and there should be no income tax for them.

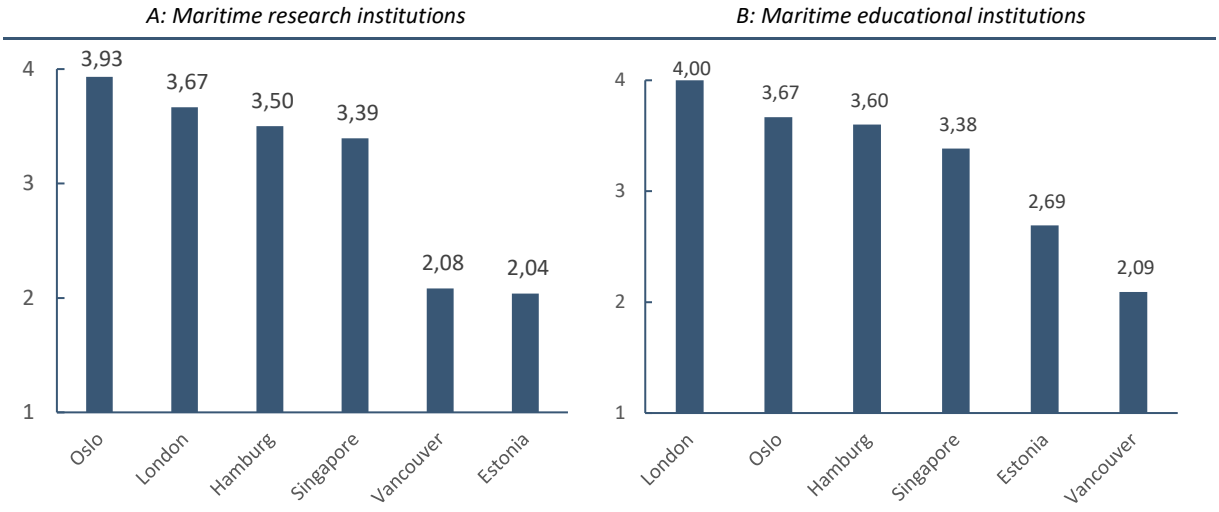
Maritime education institutions

The number of maritime education institutions found in a city, including dedicated academies and universities offering courses catering to the maritime sector, is a good indicator to assess a maritime city's culture of learning and the level of competency of its graduates. From this, maritime companies can greatly benefit by sourcing skilled local maritime personnel (Menon Economics; DNV, 2022). In Estonia there are two maritime educational institutions. These are the Estonian Maritime Academy, a structural unit of Tallinn University of Technology, and the Estonian Nautical School. Further on there are two maritime training centers, Reval Training Center for offshore, aviation and maritime trainings and Pärnu Maritime Training Center. Lat also provides trainings for motormen.

When considering the number of maritime educational institutions, London is the leading city in this indicator, being home to prestigious maritime academies such as Cass Business School and London Shipping Law Center. Rotterdam places second, with the maritime education offered in the city having a strong global reputation for excellence, and a variety/specialization of different courses available. Athens and Hamburg are equally sharing the 3rd position, both cities have 13 maritime related institutions and training facilities (Menon Economics; DNV, 2022). However, it is not necessarily the number of research and educational institutions that is important, but also the quality of the education. According to the actors in the industry, through the own-country assessment, they do not perceive the maritime research and educational institutions among the best in the world, as seen in Figure 13. In the interviews it was mentioned that maritime education is perceived as a low-status education among students, and that it is an alternative for students with lower grades who are not accepted at other studies. This means that the industry should focus on how to promote the industry, i.e., how to make it be perceived as an attractive industry to work in.

[32] *This regime applies to ships used for international carriage of goods and passengers at sea, provided the ship meets the criteria set out in the Income Tax Act, including having a total gross tonnage of at least 500, flying the flag of a Contracting State of the European Economic Area, and being used for international carriage of goods or passengers by sea (excluding passenger ships engaged in regular services in the European Economic Area) or being a dredger or a tugboat.*

Figure 13 A: Our maritime research institutions are among the best in the world. B: Our maritime educational institutions are the best in the world. Source: Menon Economics, 2022



One reason for the relatively low score may be connected to the ability to adapt to the technological development in the industry. The maritime industry is changing fast, with autonomous systems, more digitized systems, and the introduction of zero-carbon fuels. This leads to a change in the competence needed in the industry. According to both the industry and the Academy, this is a challenge. The companies in the industry feel that the process is too slow, and that they need to take more responsibility themselves in making sure that their employees have the competence they need. The Academy has the same perception. The support system for research and education is slow and hard to change, and there is a need for a more flexible system so that the curriculum can be changed to match changes in the industry. The Academy mentioned that they are willing to try to find solutions to support the fast development in the industry. However, this also requires that the industry reflects upon what competence they will be needing in five to ten years, and not just as of now.

The Estonian Maritime Academy is the only institution that teaches future seafarers at a higher level. The courses are however outdated in terms of digital competence, according to the Academy itself. In addition, there is a lack of technical education, e.g., technical engineers, electrical mechanics and specialized maritime competence. The Academy has a goal of making their educational offers more international and more up to date related to the technological development in the industry. However, this requires more resources and funding. One issue is that the Ministry of Education does not understand the need for specialization, where they wish to consolidate the program. Another issue is the access to funding. There is a lack of resources for education because the responsibility for the educational system is divided between several ministries[33], with the implication that no one claims responsibility.

Political and legal framework that shapes the attractiveness of Estonia as a host for shipping companies

The political and legal framework is important as a basis for the attractiveness of Estonia as a host for shipping companies and other maritime companies that serve the shipping companies, both domestic and foreign ones.

[33] *Ministry of Education and Research, Ministry of Economic Affairs and Communications, Ministry of Social Affairs, Ministry of the Environment – based on interviews.*

The political and legal framework also influences the competitiveness of the companies in the maritime industry, for example through investments in infrastructure, R&D and in education of people to the industry.

The technical specification that serves as the basis for this tender requires that we should "*identify obstacles and make proposals for entering vessels in the Estonian register and for developing the coastal sector, analyze the conditions of other states according to the questions provided in Annex 2 to the technical specifications, incl. fill in the table indicating whether the regulation in force in Estonia is stricter or more lenient*."

The competitiveness of the political and legal conditions of Estonian shipping will be assessed based on Annex 2 to the Technical Specification, where Estonia is compared with several other countries, e.g. Denmark and Singapore, along 5 dimensions: Ship mortgage, Ship registration, Tax incentives, Tax agreements and Working conditions. We will use existing literature, data and other information to compare Estonia along those dimensions in Annex 2, which will be submitted as a separate report.

The way forward

Estonia is scoring differently on the five pillars described in this report. Estonia has a fairly strong shipping community, where Estonia is the largest country in the Baltics measured in CGT for management of ships. On the other hand, the maritime finance and law services are less developed and rather limited. The shipbuilding industry is smaller compared to the two other Baltic countries, mainly due to higher labor costs. Furthermore, the actors in the industry also experience a lack of maritime technological competence. Estonia is also ranking relatively low on the ports and logistics pillar, mainly due to the relatively low amount of TEU in the ports compared to larger ports in other nations. Despite this, Estonia is scoring relatively high on the attractiveness and competitiveness pillar, mainly due to the ease of doing business in the country and the tax system. There are, however, indicators within this pillar that the country is ranked lower on, such as the proximity to key customers and suppliers. Regarding the educational system, Estonia is ranked quite well. However, there is a concern that the curriculum is outdated considering the technological development, and that there is a need for more funding to ensure that the educational system is in line with the needs of the industry.

Critical success factors for a maritime country may include the acknowledgement of the maritime cluster as a cornerstone of the national and regional economy, as well as engagement with other maritime clusters, utilizing own strengths and supplementing for shortfalls. Further on, the adoption of favorable policies, to allow actors to stay competitive in a globalized and evolving environment is of importance. Based on the findings of this report, there are some measures Estonia could take to increase the competitiveness of its maritime industry. Some of the measures proposed below, might require a further deep dive and a more detailed knowledge base to ensure advancement, such as the work on ensuring a strong maritime cluster and how to attract relevant competence.

Enhancing Estonia as a flag state:

Estonia has for the last ten years been working on enhancing the competitiveness of the Estonian flag. In July 2020, a new package of laws, with the goal of bringing more ships under the Estonian flag, entered into force. This included the possibility for shipping companies to opt for special tax regimes, more favorable tax regimes for seafarers, and it made it easier for foreign shipowners to register ships in the country without having to use Estonian crew. These measures have however seemed to have had little, if any, effect so far. According to several actors in the industry, the legal framework related to the flag registration is difficult to understand and the information is perceived as not accessible. Furthermore, the process of changing the flag is described as too complex, and so there is a need to simplify it. Even though the government has tried to ease up the bureaucracy, having foreign workers approved to work on Estonian ships is still perceived as a complex process. The e-residency was mentioned as a potential incentive to fly the Estonian flag, but the information is not accessible enough, hence there is an insecurity about how it works. Lastly, the tax scheme was described as less favorable compared to other flag states, such as Latvia, which is perceived as more favorable in terms of e.g. tax schemes.

It will be important for the government to think about the flag registration as a value creating service for the shipping companies, where the focus should be on the shipowners' need – not as a bureaucratic process and system. It will be important that the information is easily accessible and that the process is not perceived as complex. In addition, it is important that the tax policy is predictable. The political climate has made it hard to have a consistent long-term plan for maritime business, because changes in political parties may affect the maritime industry significantly. An unpredictable tax policy will first and foremost affect owners, and it will weaken the maritime industry as a cluster. Over time it might have the effect that it becomes less attractive to own companies in Estonia.

The importance of a strong cluster – cooperation

In an industry with strong cluster dynamics, knowledge is continuously improved and dispersed, upgrading both companies and human resources. The results in this report reveal a significantly lower level of trust and cooperation among the companies than what we observe in strong maritime clusters like Oslo and Hamburg. Maritime clusters have an important impact on the development of a regional industry, as they can enhance social and economic benefits and innovation within a region. There are three maritime organizations in Estonia that for some are defined as clusters, namely the Estonian Shipowners Association, Estonian Ports Association, and Estonian Transit and Logistics Association. There is however a need, according to the actors in the industry, for an overarching umbrella organization that can unite the three associations and other actors to provide legitimacy to the political agenda of the industry. An umbrella organization can also stimulate cooperation and information sharing by facilitating network arenas and communication platforms for the companies and other actors in the industry.

The industry's attractiveness will be important to attract relevant competence

Access to relevant competence is one of the key barriers against continued growth for maritime companies worldwide. To attract and retain a relevant and competent workforce it is vital to be an attractive and competitive industry. The technological development that takes place in the maritime industry also takes place in other industries. That means increased competition about recruiting relevant people. The industry's actors must therefore take responsibility for profiling the maritime industry in general, and shipping companies in particular, in a clear and appealing manner. It will be important to think about how the industry appears externally and as a maritime cluster.

The industry must enhance its profiling of the industry, focusing on showing the possibilities that exist and what career paths are possible within the industry. This can for example be the opportunities when working at sea – from working in the engine room to becoming a captain, as well as the onshore opportunities within the maritime companies in the cluster. Furthermore, it will be important to emphasize that the industry is relevant for people with different levels and types of educational background, from people with experience from sea to economists, lawyers, technologists and engineers.

One way to attract young people is the implementation of maritime apprentice programs. This is done in Denmark and in Germany, where companies offer apprentice positions to students who have completed upper secondary school or a bachelor's degree, either as a break between studies or as an integrated part of a study program. This allows the industry to attract young people early in their educational career, as well as letting students experience the industry.

Interaction between the industry and academia

The industry, academia and research institutions are all connected in a complex interaction where companies send innovation impulses and knowledge needs to universities and colleges, which further supply the business community with relevant knowledge and competence. To ensure that the industry's competence needs are met, it is important that the actors cooperate and communicate, so that the education providers get insight about the competence needs of the companies, and that the companies know what the educational institutions can provide.

The maritime industry is changing fast, with autonomous systems, more digitized systems, and the introduction of zero-carbon fuels. This leads to a change in the competence needed in the industry. According to both the industry and the educational institution, this is a challenge. The companies in the industry feel that the process

is too slow, and that they need to take more responsibility themselves in making sure that their employees have the competence they need. The educational institutions have the same perception. The support system for research and education is slow and hard to change, and there is a need for a more flexible system so that the curriculum can be changed to match changes in the industry. It is important that the industry reflects upon what competence they will be needing in a five to ten years perspective, and not just as of now, for the educational institutions to be able to adapt their curriculum based on the industry's need.

Opportunities related to the offshore wind market

Estonia is fast-tracking offshore wind farm projects with the aim of becoming the largest producer of wind energy per capita in the world (Estonian Investment Agency, 2022). Estonia is planning to install wind farms with a total capacity of 23,158 GW. In comparison Latvia's and Lithuania's plans are for wind farms equivalent to 1000 GW and 1400 GW respectively. It is important to note that 99 percent of the planned GW in Estonia is still in a concept phase/early planning (4C Offshore). There are already some initiatives going on, where Port of Tallinn and Utilitas Wind have signed a Memorandum of Understanding with the aim of accelerating the development of offshore wind energy in Estonia and the Baltic states. Cooperation in the development, construction and maintenance of offshore wind farms will enable new business opportunities while developing local expertise.

The ocean wind industry creates large opportunities for the maritime industry, where maritime actors will be a critical part of the value chain for developing and operating floating and fixed ocean wind farms. Specialized vessels for installation and for service/maintenance must be built, outfitted and operated. Estonia aims to be a place where new technological solutions for offshore wind farms are developed, tested and manufactured. These are opportunities that the industry, together with the government, should focus on in their effort to enhance the competitiveness of the country's maritime industry. To take advantage of these opportunities, the industry should also aim for more cooperation and alignment with the advanced ICT-sector in Estonia.

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Appendix A: The four pillars

Shipping

The shipping pillar captures the dimension of how developed the shipping community in the country is. We measure this by looking at a series of measures that gives us an indication about whether companies want to establish their business in the country. More specifically, we will assess 6 objective indicators, illustrated below:

Indicator	Description	Source for information
Fleet size – management	CGT owned by ship managers registered in each city	Clarksons World Fleet Register
Fleet size – owner	Size of fleet (CGT) controlled by shipowners registered in cities across the world	Clarksons World Fleet Register
Fleet value – owner	National fleet values assigned to cities by multiplying with each city's corresponding national CGT ratio	Clarksons World Fleet Register & WFM Vol 12 No 10 October 2021
Number of shipping companies with HQ in the country	Number of shipping companies with headquarters in each city, given that the shipping company owns more than 5 vessels	Clarksons World Fleet Register
Operational revenue for shipping companies	Operational revenue (turnover) for shipping companies (NAVE rev. 2: 5010 & 5020), allocated to city HQ locations for each company	Bureau van Dijk (ORBIS database, most recent and updated data by November 2021)
Low carbon intensive fuel types – share of fleet size	Environmental impact of shipowners' fleet - measured as share of fleet (in GT) with low carbon intensive fuel types.	Clarksons World Fleet Register & Alternative Fuels Insights (DNV 2019)

Maritime technology

The maritime technology pillar captures the dimension of whether the maritime industry in the country is on the forefront of the technology in the industry. We capture this through 7 objective indicators, illustrated below:

Indicator	Description	Source for information
Shipyards (CGT)	Size of fleet (CGT) delivered by shipyards, including orderbook and ships built in 2019 and onwards. Yard fleet size distributed to cities based	Clarksons World Fleet Register

	on the location of the shipyards	
Shipyards (GT) - Low carbon intense ships built	Size of fleet (GT) delivered by shipyards, including orderbook and ships built in 2019 and onwards, measured by low carbon intensive fuel types	Clarksons World Fleet Register & Alternative Fuels Insights (DNV 2019)
Operational turnover of companies in maritime technology industry	Operational revenue (turnover) of companies in the maritime technology industry (NACE rev. 2: 3011, 3012, 3315). Turnover values are aggregated and distributed to the HQ locations of the technology companies.	Bureau van Dijk (ORBIS database, most updated and recent data by November 2021)
Classified fleet	The sum of CGT controlled by each Classification Society, distributed to cities based on each HQ location.	Clarksons World Fleet Register

Market value of ships built at shipyards	Purchasing price of ships built at shipyards, sold in the in the year of 2019, 2020 and 2021. Purchasing price aggregated on city level after location of the shipyard.	Clarksons World Fleet Register
Number of maritime patents	Number of maritime patents owned by firms with HQ in the city. IPC patents classification: B63B, B63C, B63G, B63G, B63H, B63J	Bureau van Dijk (ORBIS Intellectual Property Database)
Number of maritime education institutions in each city	Number of maritime education institutions in each city	World Shipping Register: world-ships.com

Maritime services (finance and law)

The maritime service pillar captures dimensions related to how easy access it is to maritime services in the country. We capture this through a series of indicators related to how developed and efficient the law and finance in the maritime industry in the region is. For maritime services, we use these 8 objective indicators:

Indicator	Description	Source for information
Maritime Legal Expertise by Who's Who	Number of maritime legal experts in each city, assessed by Who's Who	Who's Who Legal 2021
Number of maritime lawyer companies	Number of maritime lawyer companies registered in each city	World Shipping Register, world-ships.com
Insurance Premiums	National collected insurance premium for P&I, hull, cargo, offshore from IUMI and CEFOR. Allocated to cities after economic	IUMI, CEFOR, Bureau van Dijk (ORBIS database, most recent and updated data by November 2021)

	activity of marine insurance companies (NACE code 6512) registered in each city	
Mandated loans	Value of maritime syndicate mandated loans issued from bookrunner/MLA. Sums allocated after location of the HQ to each bookrunner/MLA	Dealogic, Bloomberg and Loan Pricing Corporation. League tables for top 10 Bookrunner/MLA in 2020
Shipping banks portfolio	Top 40 shipping portfolios by banks across the world, where sums are allocated to cities after the location of each bank's HQ. Lending volumes as of 31. December 2020	Petrofin Bank Research, 2020
Number of listed maritime owner groups	Number of listed maritime owner groups on each city's stock exchange	Bureau van Dijk (ORBIS database, most recent and updated data by November 2021)
Market cap of listed companies on the city's stock exchange	Market cap of maritime companies (NACE rev. 2: 5010, 5020, 5030, 5040, 3011, 3012, 3315, 5222, 5224 and 7734). Allocated to cities based on listing information on stock exchanges.	Bureau van Dijk (ORBIS database, most recent and updated data by November 2021)
IPO/Bonds/Follow ons	Trading volume of bonds, IPO and follow ons for Jan-Oct 2021 for maritime listed companies. Volumes distributed by location of stock exchanges.	Clarksons Shipping Intelligence Network

Ports and logistics

Access to ports and logistics is essential for a well-developed maritime country. The more developed the logistic in the country is, the easier it is for foreign ships to dock and deliver to these ports. We therefore look at the ports and logistics by using 4 objective indicators:

Indicator	Description	Source for information
TEU in port	Volume of TEU handled by ports around the world for 2020. Measures how "busy" each port is. Data for top 100 ports globally.	Lloyd's Top 100 Ports 2021 (2020 data)
Size of port operators	Volume of TEU handled by top 21 port operators in the world	Drewry (2019 data)
Liner Shipping Connectivity Index	Liner Shipping Connectivity Index, on port level. 2020 data.	UNCTAD 2020
LNG available at ports	Ports with available LNG bunkering facilities. Ports are ranked based on the aggregate tank capacity of LNG	Alternative Fuel Insights DNV 2021

	bunker vessels who use the port for bunkering	

Appendix B: Questionnaire

Table 1: Assessment of Estonia's attractiveness. Source: Menon Economics/LMC 2022

1. Are you currently working in Estonia?
    a. Yes
    b. No
2. Within which of the following segments would you place your company?
    a. Shipowners
    b. Yards
    c. Service suppliers
    d. Equipment suppliers
    e. Ship designer
    f. Other, please specify
3. Do you have work experience from maritime industry in another country? (If the answer to question 1 is yes)
    a. Yes
    b. No
4. Which country are you currently working in? (If the answer to question 1 is no)
5. What position do you have in your current company?
    a. Top management
    b. Middle management
    c. Other, please specify
6. To what extent do you regard the following factors attractive in Estonia compared to alternative locations for your company?

	Highly unattractive	Unattractive	Attractive	Highly attractive	Not relevant
Proximity to key customers/markets	○	○	○	○	○
Availability of world-class competence (talents)	○	○	○	○	○
Presence of specialized/competitive suppliers	○	○	○	○	○
Access to capital (investors, banks, advisors and brokers)	○	○	○	○	○
Personell costs	○	○	○	○	○
Policy framework	○	○	○	○	○

7. To what extent do you agree with these statements about Estonia as a location (host country) for your company?

	Disagree	Partly disagree	Partly agree	Agree	Not relevant
Some of my company's most advanced and sophisticated customers are located here	○	○	○	○	○
For my type of business, Estonia is one of the global hubs where business deals and strategic decisions are made	○	○	○	○	○
The banks and financial service providers have highly specialized maritime competence	○	○	○	○	○
The maritime suppliers in the region hold a world-class technological level	○	○	○	○	○
The companies in Estonia are in the forefront of technology development in the maritime industry	○	○	○	○	○
Our maritime research institutions are among the best in the world	○	○	○	○	○
Our maritime educational institutions are among the best in the world	○	○	○	○	○
The relationships among the companies in the maritime cluster are characterized by openness and information sharing	○	○	○	○	○
When we do business with other companies in Estonia, we trust their intentions; i.e., we don't expect them to have an hidden agenda	○	○	○	○	○
There is wide-spread cooperation between the maritime companies in Estonia	○	○	○	○	○
The government and governmental bodies are supportive to the maritime industry	○	○	○	○	○
Taking all living conditions into consideration, Estonia is a good place to live and work for a family	○	○	○	○	○

8. What measures could Estonia take to increase its attractiveness for maritime companies?
9. Have you ever experienced that you need to go outside of Estonia to buy equipment or services related to maritime industry?
    a. Yes
    b. No
10. What kind of equipment and/or service did you need to buy outside of Estonia? (If the answer to question 9 is yes)
11. How would you describe the cross-company cooperation within the maritime industry in Estonia?
12. How large share of your current workforce is not from Estonia?
13. Apart from Estonians, what nationality is the most represented in your workforce?

Appendix C: Interview guide

Interview guide

1. To what extent do you regard the following factors attractive in Estonia compared to alternative locations for your company?
    a. Proximity to key customers/markets
    b. Availability of world-class competence (talents)
    c. Presence of specialized/competitive suppliers
    d. Access to capital (investors, banks, advisors, and brokers)
    e. Personnel costs
    f. Policy framework
2. To what extent do you agree with these statements about Estonia as a location (host country) for your company?
    a. Some of my company's most advanced and sophisticated customers are located here
    b. For my type of business, Estonia is one of the global hubs where business deals and strategic decisions are made
    c. The banks and financial service providers have highly specialized maritime competence
    d. The maritime suppliers in the region hold a world-class technological level
    e. The companies in Estonia are in the forefront of technology development in the maritime industry
    f. Our maritime research institutions are among the best in the world
    g. Our maritime educational institutions are among the best in the world
    h. The relationships among the companies in the maritime cluster are characterized by openness and information sharing
    i. When we do business with other companies in Estonia, we trust their intentions, i.e., we don't expect them to have an hidden agenda
    j. There is wide-spread cooperation between the maritime companies in Estonia
    k. The government and governmental bodies are supportive to the maritime industry
    l. Taking all living conditions into consideration, Estonia is a good place to live and work for a family
3. Within the last five years, have you experienced that you need to go outside of Estonia to buy equipment or services related to maritime industry?
    a. What kind of equipment and/or service did you need to buy outside of Estonia?
4. What measures could Estonia take to increase its attractiveness for maritime companies? What should the goals/ambitions be?
5. How would you describe the cross-company cooperation within the maritime industry in Estonia?

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