

REPORT

GCE BLUE MARITIME: CLUSTER PERFORMANCE AND RESEARCH, DEVELOPMENT AND INNOVATION 2023



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Preface

Menon Economics has for eight consecutive years studied the competitiveness of the GCE Blue Maritime cluster, measured by key economic performance, both in absolute terms and compared to the rest of the maritime industry in Norway and to international competitors.

Menon Economics is an employee-owned consultancy operating in the interface between economics, politics and business. Menon Economics analyses issues and provides advice to companies, organizations 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 analysis and work closely with leading academics in most disciplines.

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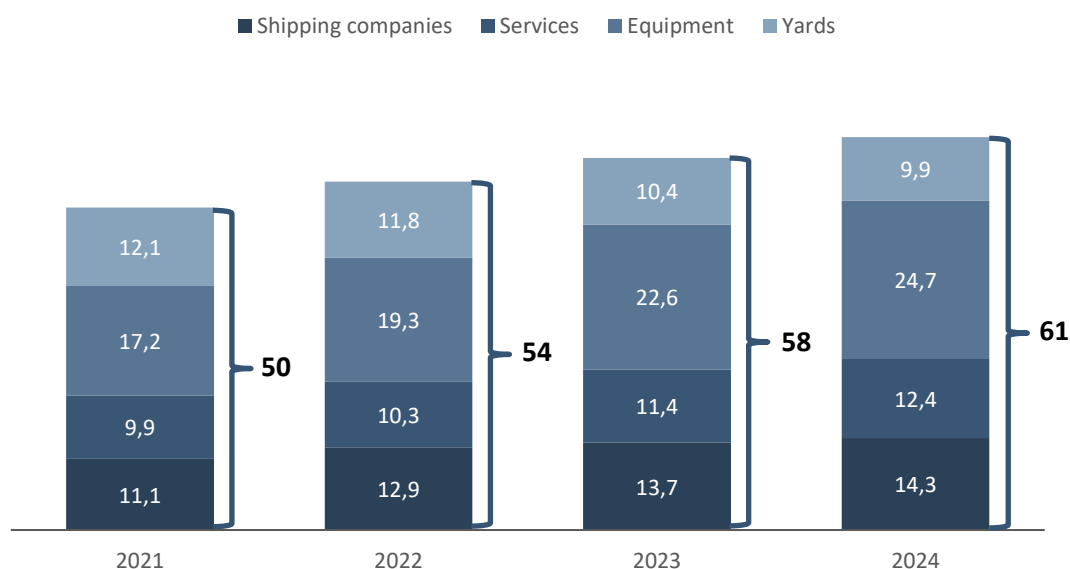
Summary

Positive revenue growth ahead

The overall revenue among the maritime companies in the Møre region has increased from 2021 to 2022 and is expected to continue to increase in 2023 and in 2024. While total revenues in the cluster were 50 billion NOK in 2021, they are expected to reach 61 billion NOK in 2024. This is only 3 billion NOK below the peak year of 2014.

As is evident from the figure below, the change in activity is not uniform between the different maritime groups. The equipment suppliers are the main driver behind the revenue development in the cluster – where expected revenues in 2024 are record high. The yards were the second largest segment in terms of revenue in 2021, but based on the result from the survey conducted among the Blue Maritime cluster, the yards' revenues are expected to decrease towards 2024. Service providers have historically followed the same development in revenues as the shipyards. This is because the most important group among the service providers are electro companies, which are directly related to shipbuilding activity in the region. However, in the period 2021 to 2024, we observe a decoupling in expectations, where service providers expect a higher growth compared to the shipyards. Shipping companies is the segment experiencing the highest growth from 2021 to 2022 and is also expecting a continued increase in revenues towards 2024.

Figure 1: Overall revenue growth for the four main segments in the Møre region, 2021-2024. Estimates of revenues in 2023 and 2024 based on reported information from companies. NOK billion. Source: Menon Economics



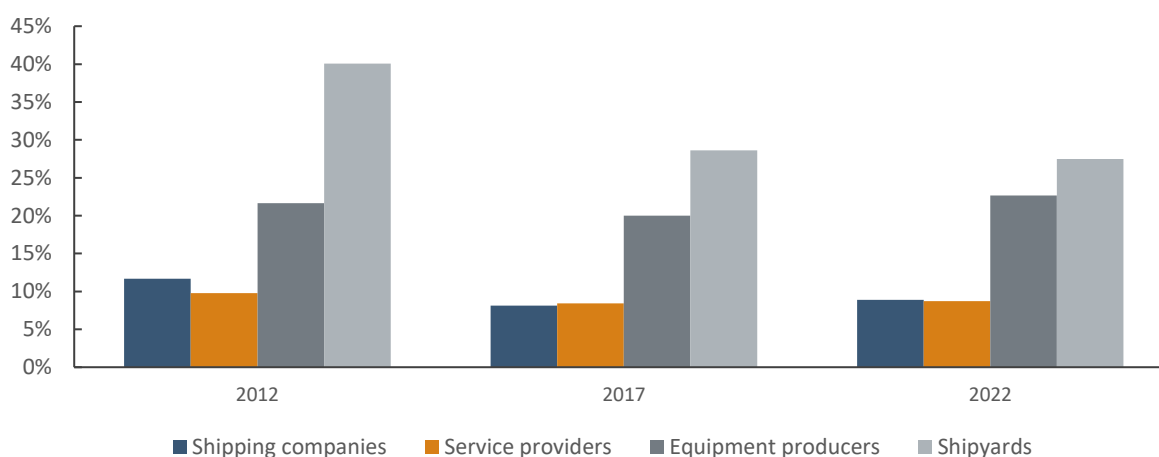
Continued growth in the region's value added since 2018 – but still below 2014

After experiencing a sustained decline in activity from 2015 and onwards, the overall value added among the maritime companies in the Møre region has gradually increased from 2018 to 2022, equivalent to 50 percent in

the period. It is primarily EBITDA that has contributed to the surge in value added in recent years for the Møre region. The increase in EBITDA suggests that the region's core operations are generating more income. This can result from increased sales, better cost management, or a combination of both. The general trend is similar to the results from the previous two years' reports.

When comparing the value added in the Møre region to a national benchmark, we observe a high correlation between the two. This tells us that the development in the Møre region and the benchmark is to a large degree driven by market characteristics. A more intuitive way of looking at the cluster's development compared to the domestic industry is to examine the cluster's share of the value added in the domestic maritime industry. This can illustrate the cluster's "market share" of the national maritime market. Overall, the development has differed greatly between the four maritime groups over time, as seen in the figure below.

Figure 2: The Møre region's share of the value added in the Norwegian maritime industry – in each of the four maritime groups. Source: Menon Economics



The most striking result is the Møre yards' value creation as a share of Norwegian yards in 2012. In this period the Møre yards stood for around 40 percent of the value added in the shipbuilding industry in Norway. In 2022, this share is close to one third of the value creation in the domestic shipbuilding industry. The decrease has mainly been driven by lower activity and higher expenses for the biggest newbuilding yards due to the transition from oil and gas to other market segments. Looking at the shipping companies, their share in value creation peaked in 2014 at just below 14 percent. However, following the oil crisis Møre's share dropped towards 2018 before stabilizing at and reaching a level of 9 percent in 2022. This is the same level as the service providers. Equipment producers also experienced a decrease in their income following the oil price fall. However, this group has recovered from this development faster than the other groups, reflecting their flexibility. Equipment producers in the Møre region have a diversified portfolio, which makes them less vulnerable to changes in one market segment.

Increased profitability expectations

Two thirds of the cluster members expect a stronger profitability in 2023 compared to 2022, where the profitability expectations now are on the same level as pre-covid in 2019. However, the global economic situation has also led to a higher share of the cluster members expecting a weaker profitability. It is especially the input prices affecting the cluster members' profitability expectations, where around 87 percent of respondents claim that increased input prices will result in lower profitability in 2023. The findings are in line with last year's survey.

The second most important factor that negatively affects the cluster members' expectations is the changes in exchange rates, where buying goods and services with foreign currencies became more expensive for Norwegian businesses. On the other hand, almost the same number of respondents report that the exchange rate is affecting their profitability positively, due to the fact that Norwegian goods and services have become cheaper for foreign buyers. This is an advantage for the exporters, as well as for the shipbuilding industry that competes against foreign shipyards. Furthermore, 15 percent believe that access to relevant competence will affect their profitability negatively, while on the other hand two thirds of the cluster members expect that the market development will affect their profitability positively, based on the expected positive outlook in the respective markets cluster members deliver goods and services to.

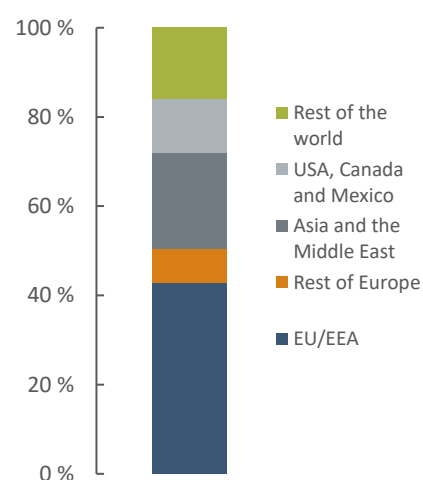
Export constitutes half of the cluster's revenues – Europe the most important market

The maritime industry is one of the largest export industries in the Møre region, with half of the Blue Maritime cluster's revenues coming from export of goods and services. Export revenues are important, both because they serve as an indicator of the companies' competitiveness and because success in the export markets contributes to increased innovation and productivity among subcontractors, collaboration partners and other actors in the industry.

There are, however, relatively large differences between the four maritime groups' export shares. The equipment producers are the group with the highest export share, where 70 percent of revenues in 2022 were export. The equipment producers are well-positioned in the global market, especially in technological products. The service providers are the second largest group, with an export share of 55 percent, followed by the shipyards where more than 35 percent of revenues stem from export activities. The shipping companies in the Møre region have the lowest export share, equivalent to 20 percent in 2022. The main reason for this is that this group consists of companies within the aquaculture and offshore segment, where most of the activity is domestic or on the Norwegian continental shelf, where the activity level has been high. It is however important to mention that offshore wind is becoming an increasingly significant market segment for offshore shipping companies in the Møre region, meaning that export revenues are expected to increase as the offshore wind market matures.

The EU/EEA is the most important export market for the cluster in 2022, constituting around 43 percent of the export. This market is important for all four groups, but in particular for the shipping companies, where 80 percent of the export in 2022 went to the EU/EEA. The second most important export market for the cluster is Asia and the Middle East. This is a market that is especially important for the equipment producers, as they deliver a variety of equipment to different ship types being built in this region, as well as directly to the yards. There is reason to believe that the Møre region will maintain its position as an important exporter. Growth opportunities for the maritime industry are favorable, both in the domestic market and in export markets. The opportunities are particularly significant in relation to green transition and smart technology/automation.

Export revenues of Blue Maritime Cluster distributed by geographical region, 2023



Offshore wind largest market segment

The offshore wind market has become the largest market segment in terms of revenues for the yards, equipment producers and service providers, equivalent to 17 percent of the aggregate market. This is an increase of four percentage points from last year. The result is mainly driven by revenues from the shipyards and service providers. As the offshore wind market matures, there will be a need to build more offshore wind vessels to meet the government's ambitions. This leads to opportunities for the Møre yards, which have competence and experience from building offshore service vessels. The second largest market is the oil and gas market. This market has experienced a decrease in the last years, where the share of total cluster revenues in 2017 was around 50 percent as opposed to 15 percent today. Revenues related to both fisheries and aquaculture have also increased in the last five years, from 17 percent in 2019 to 25 percent in 2023. On the other hand, revenues from the cruise and ferry market have experienced a decrease. In 2019, pre-covid, this market segment constituted one third of the three maritime groups' revenues. In 2023, this share has decreased to 11 percent. The activity level in building of cruise ships and bigger ferries was high before 2020, which was a consequence of both a significant effort to decarbonize the Norwegian ferries and fast ferries along the coastline, and increased newbuilding activity of cruise and expedition cruise in the Norwegian shipyards. After the covid-19 pandemic, this market has stagnated. There is, however, reason to believe that the cruise market will grow fast in the coming years. The question then is whether the maritime industry in Møre and Romsdal will be able to retain its strong position.

Research, development and innovation in the cluster

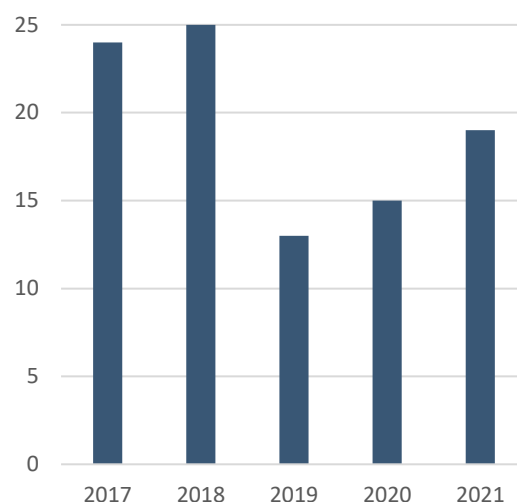
Research, development and innovation (RDI) is a key driver that helps companies stay competitive in the market – and a prerequisite for renewal and long-term competitiveness of the cluster. Government initiatives can support RDI activities in several ways, including funding mechanisms and incentives or programs to encourage RDI collaboration. Møre companies have received public support for several RDI projects, this includes from Innovation Norway, The Research Council of Norway Enova and Skattefunn. The support reached a peak during the pandemic years of 2020 and 2021. Equipment producers is the maritime group with the highest share of companies receiving support from the different initiatives, while shipping companies have the highest average funding amount.

The survey conducted among cluster members indicates that half of the companies experience a higher level of research, development, and innovation activities today compared to five years ago. Furthermore, 62 percent of the companies anticipate an even higher level of RDI activities five years into the future. This suggests that these companies have a positive outlook on the trajectory of their RDI efforts and expect further advancements and innovations in their respective segments. Despite Møre companies' high participation in innovation activities, several factors can act as barriers to further innovation and development. The lack of support for full scale demonstration of products and/or solutions stands out as the most important barrier among the companies. Financial support, access to relevant partners, and access to relevant test and piloting facilities are also mentioned as barriers against innovation activities.

As companies strive to secure their foothold in ever evolving and competitive markets, the strategic protection of intellectual property becomes paramount, giving rise to patents and design protection as a powerful and insightful indicator for research, development, and innovation. In 2017 and 2018, the companies in the cluster had approximately 25 patent and design applications, as shown in the figure below. The number of applications dropped sharply in 2019, but has gradually increased in the two following years.

While the overall number of applications has increased from 2019 to 2021, there has been a shift in the relative importance of patent segments. Previously focused on transportation, the aquaculture segment has gained prominence in recent years, aligning with the growing significance of fishing and aquaculture within the industry. Equipment producers hold the largest share of companies applying for patents within the maritime cluster, while service providers have the biggest share of design, driven by ship design companies. In the survey we have conducted with Blue Maritime Cluster members we found that 65 percent of the responding companies had a form of technology that was protected by intellectual property rights. The overall results demonstrate that Blue Maritime Cluster member place a significant emphasis on intellectual property and recognize the importance of protecting their technologies and assets before bringing them to market.

Number of patent and design protection applications from maritime companies in Møre and Romsdal. Source: Patentstyret



Introduction

GCE Blue Maritime is one of three Global Centres of Expertise in Norway – the highest level in the hierarchy of Norwegian Innovation Clusters. To become a GCE, a cluster must prove that it has established a systematic collaboration between the participating companies, a partnership characterised by dynamic relations with innovative power. The GCE clusters must also have a strong potential for growth in national and international markets and together form a robust innovation system.

Menon Economics has for eight consecutive years studied the competitiveness of the Blue Maritime cluster, measured by key economic performance, both in absolute terms and compared to the rest of the maritime industry in Norway. In this year's report, we place more emphasis on the cluster's research, development and innovation activities, as well as patents and other international property.

The report is structured as follows: We first provide a short summary of the main findings in the report. Then, in the chapter titled "Economic performance of the maritime companies in the Møre region", we take a closer look at the economic indicators. This includes present revenues, expected revenues, profitability in the short term, value added and employment. It also includes a brief view of the cluster's export

activities and market segments. In the next chapter we look at the economic development for the four main maritime groups, namely shipping companies, shipyards, equipment suppliers and maritime services (including ship designers). A selection of the leading companies within these four segments is shown in the figure above to illustrate the scope of the activities in the cluster. The analysis in the two above-mentioned chapters is based on accounting data from the companies, together with primary data collected from the companies through a tailor-made questionnaire. The deep dive in this year's report is research, development and innovation (RDI). This chapter includes a mapping of the cluster's current and historical RDI activities, as well as the companies' use of patents and other intellectual property.

Figure 3: The four segments in the cluster with company illustrations



Definitions and delimitations

Blue Maritime cluster: This term refers to current and previous members of the Blue Maritime cluster, who have received the survey and were asked about their current financial situation, expectations about the future, and other questions that are presented later in the report. We received 55 answers in this year's survey.

Møre region: This term refers to all companies within the maritime sector that are registered in Møre and Romsdal in Norway. Figures presenting historic development of financial data are based on this sample.

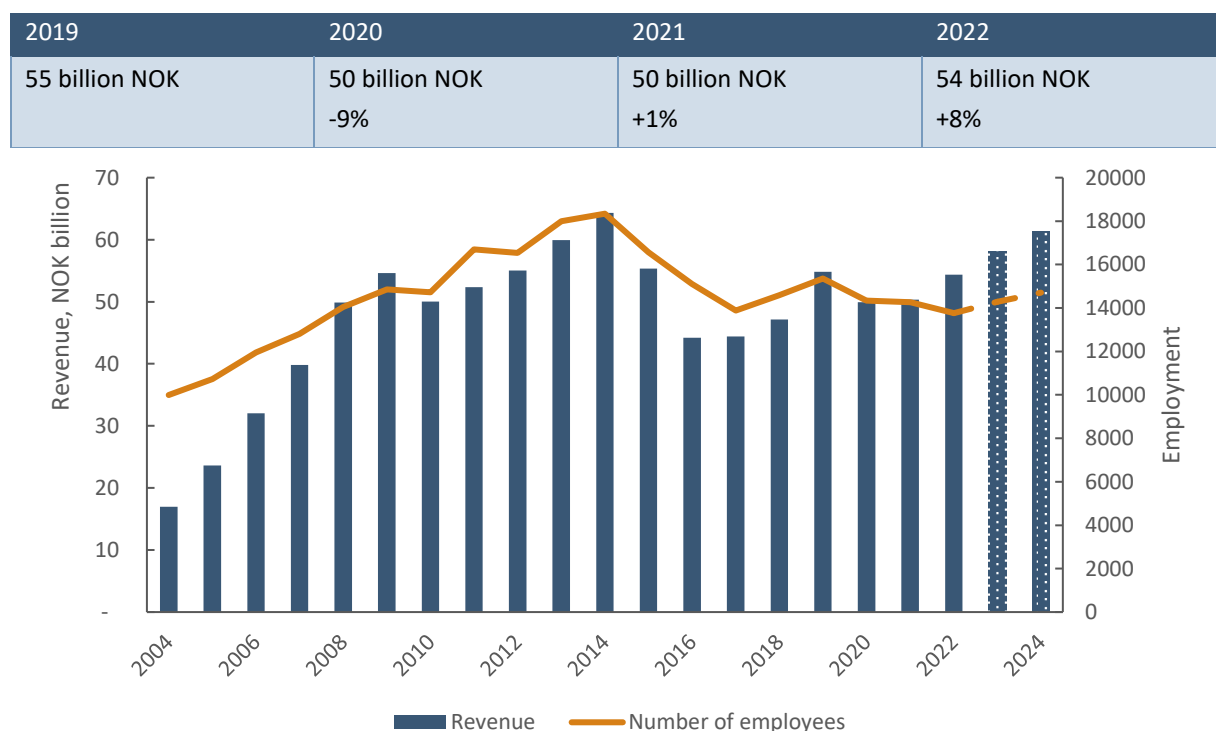
Historical financial data presented in this report up to 2022 are based on all maritime companies in the Møre region, whereas estimated financials for 2023 and 2024 are based on the answers we have received from former and current members of the Blue Maritime cluster.

Economic performance in the maritime companies in the Møre and Romsdal region

Positive revenue development – mainly driven by the equipment suppliers

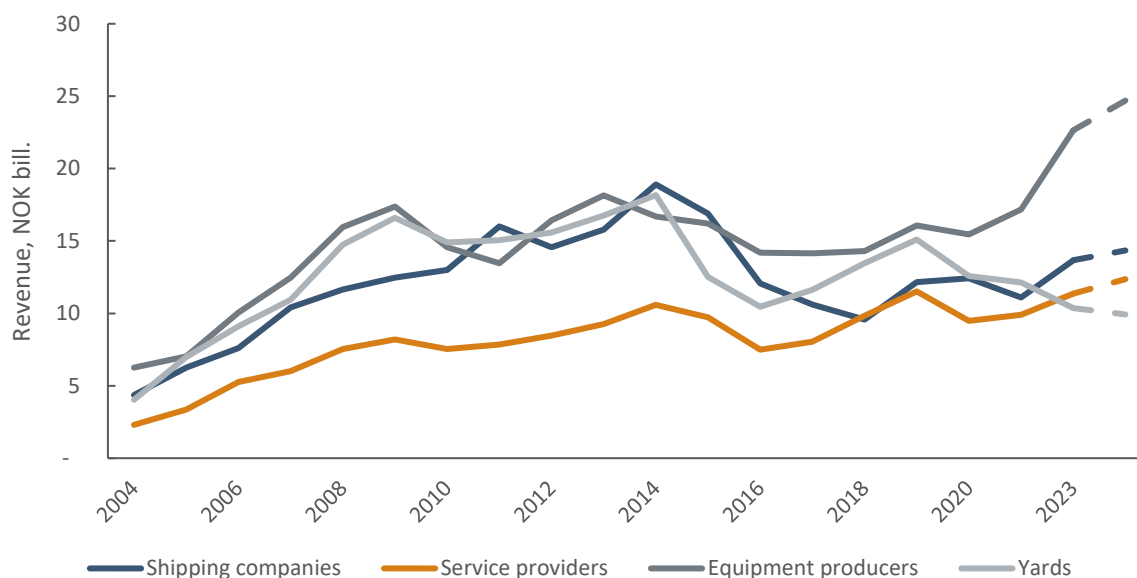
In 2022, the maritime companies in the Møre region experienced an 8 percent increase in overall revenue compared to 2021. This growth signifies a recovery from the low growth observed in the previous two years and a recovery from the effects of the pandemic. As is evident from the figure below, we expect a positive outlook for revenue and employment growth in both 2023 and 2024. Both estimates for 2023 and prognosis for 2024 are based on a recently conducted survey among the current and previous members of the Blue Maritime cluster. Furthermore we find that equipment suppliers are the main drivers behind the positive outlook, followed by service providers.

Figure 4: Table: Revenue in the Møre region, 2019-2022. Figure: Aggregate revenue and employment development in the Møre region, 2004-2024. Estimates of revenues in 2023 and 2024 based on reported information from companies. Source: Menon Economics



The change in activity levels from 2021 to 2022 was not uniform between the different maritime groups in the Møre region. Three of the four maritime groups experienced an increase in revenues, driven mainly by strong markets and weak Norwegian currency. While the shipping companies experienced an increase of around 16 percent, the increase was 13 percent for equipment producers. The service providers experienced an increase of 4 percent while the shipyards experienced a decrease of 2 percent. This is shown in the figure below.

Figure 5: Revenues for the four maritime groups in the Møre region, 2004-2024. Estimates of revenues in 2023 and 2024 based on reported information from companies. Source: Menon Economics



The equipment suppliers are the biggest group in terms of revenues in 2022, as well as in 2023 and 2024, given the Blue Maritime cluster's expectations. As seen in the figure above, the equipment suppliers' revenues in 2024 are expected to be at a level that is 18 percent higher than in 2019 pre-pandemic. The shipping companies is the second largest segment in terms of revenues. Shipping companies recorded a significant growth from 2021 to 2022, mainly driven by the surge in oil prices and increased activity in the offshore oil and gas sector. Our estimates for 2023 and 2024 show that the shipowners in the Møre region are expecting their revenue level to continue to increase at a steady pace.

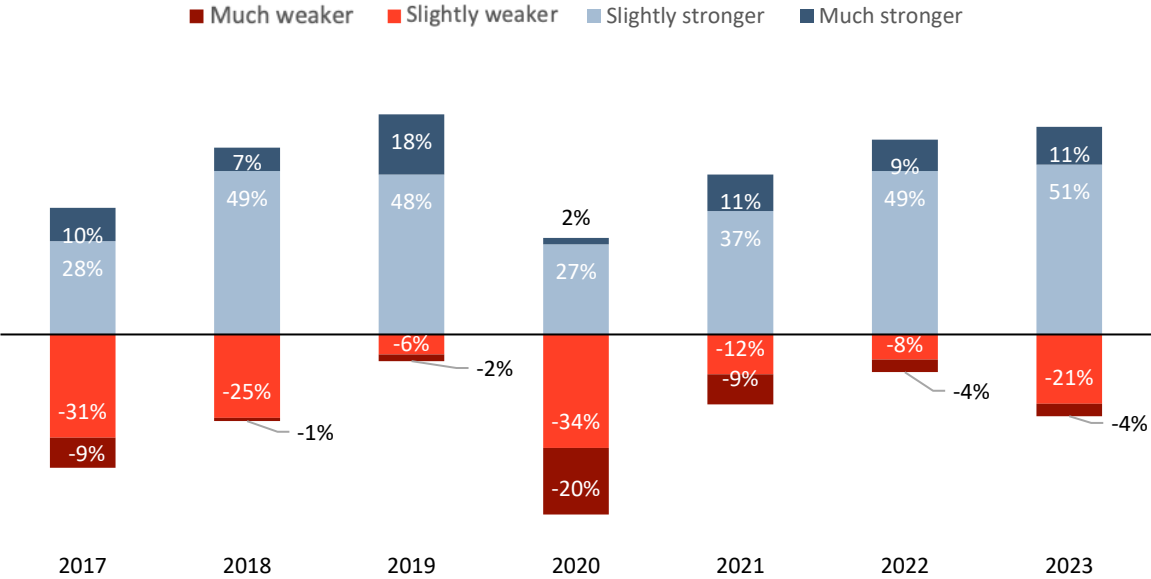
The service providers have also experienced an increase in their revenue from 2021 to 2022, and this is expected to continue towards 2024. The service providers have historically followed a similar development as the shipyards, but as seen in the figure above, the shipyards have experienced a decrease in their revenues from 2021 to 2022 and revenue is expected to continue falling towards 2024. This is the opposite of what the results showed in last year's cluster analysis. This is somewhat surprising given that a depreciation of the Norwegian krone makes foreign shipping companies consider the Norwegian building market as attractive again.¹

Increased profitability expectations

Profitability expectations for the Blue Maritime cluster in 2023 are quite positive as two thirds of the members expect a stronger profitability in 2023 compared to 2022. Profitability expectations showed an upward trend before the Covid-19 pandemic hit in 2020 and drastically reduced the cluster's prospects. Expectations have since recovered and are almost back at 2019 levels. The share of members expecting higher profitability increased slightly from 2022 to 2023. However, the share of members expecting weaker profitability increased significantly, as seen in the figure below. The fact that we observe increasing shares of both increasing and decreasing profitability implies that there are fewer companies that expect their profitability to remain unchanged.

¹ <https://www.kystens.no/industri/norske-verft-er-bliitt-mer-attraktive-i-utlandet/2-1-1511580>

Figure 6: The Blue Maritime cluster members' profitability expectations: "How do you expect operating profits to develop this year compared to last year?". N= 54 Source: Menon Economics

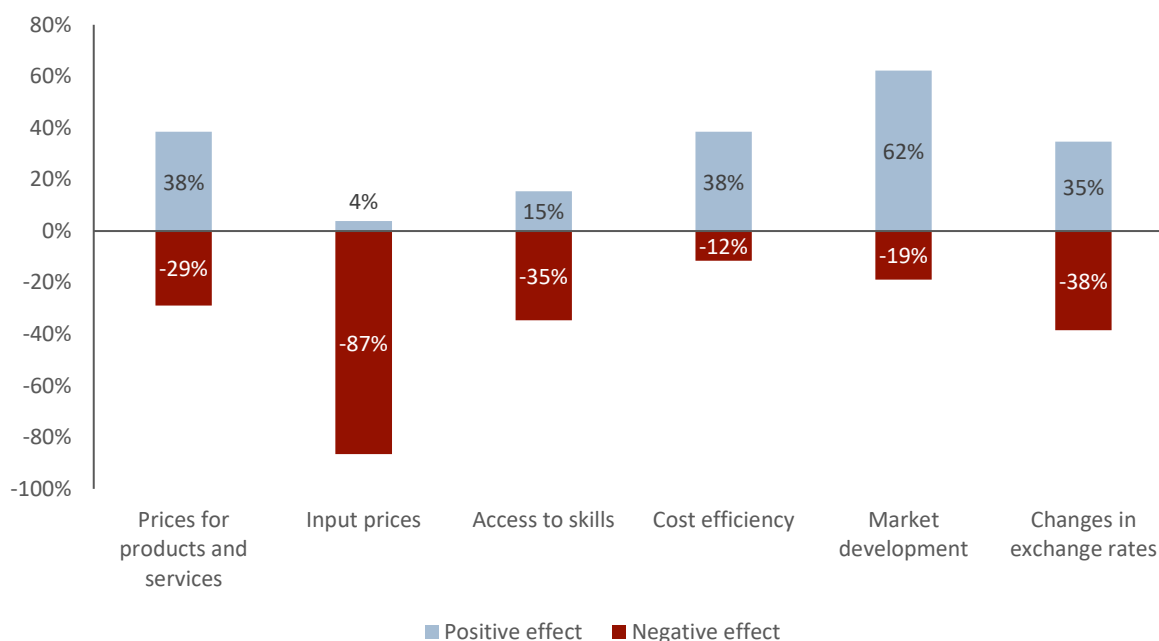


The expected decrease in profitability for cluster members must be seen in the light of the recent developments in the markets cluster members are operating in, as well as the global economic situation. Figure 7 shows the factors that have affected the profitability of cluster members in 2023. As shown in the figure, two thirds of the respondents expect the market development to affect their profitability positively. This indicates that Blue Maritime Cluster members are expecting a positive outlook in the respective markets they are operating in, such as offshore oil and gas, offshore wind, as well as fishery and aquaculture. Another important factor affecting profitability expectations is prices for products and services, followed by cost efficiency, with one third of respondents claiming a positive effect of these on their profitability. Increased prices on goods and services cluster members provide will bring about higher revenues. Similarly, cost efficiency in production and development processes contributes to lower costs and affects the profitability in a positive way.

The factor that is affecting the profitability expectations most negatively is input prices. Around 87 percent of respondents claim that increased input prices will result in lower profitability in 2023. The findings are in line with last years' survey. Global inflation fueled by energy prices, as well as increasing wage costs to keep up with the prices have been a known trend in many sectors, including the maritime sector. These developments in turn translate into higher input prices for the companies in the region.

The second most important factor that negatively affects the cluster members is the changes in exchange rates. The Norwegian krone has experienced a depreciation since July 2022. As a result of this buying goods and services with foreign currencies became more expensive for Norwegian businesses, which is experienced as a cost increase. However, it is important to note that while 38 percent of the respondents see exchange rates as a factor that affects their profitability negatively, almost as many respondents show this as a factor affecting it positively. The mechanism behind this is mainly that Norwegian goods and services have become cheaper for foreign buyers, which can be seen as an advantage for the exporters, as well as for the shipbuilding industry. We see a similar divide when we look at how prices for products and services have affected the cluster members. While 38 percent have been positively affected by this, almost 30 percent have been affected negatively.

Figure 7: Reported reasons for expected reduced (red) and improved (blue) profitability in 2023. N= 54. Source: Menon Economics



We see that (lack of) access to relevant competence is another factor that is affecting cluster members' profitability negatively. This is a general challenge in the maritime industry, where many companies are concerned about not having access to people with the competence needed following the technological development² (Menon Economics, 2022). On the other hand, 15 percent of the cluster members do believe that access to relevant competence is a factor that will contribute positively to their profitability in 2023. This is a unique by-product of the cluster dynamics and unique positioning of the Norwegian maritime industry in the Møre region. With significant experience in shipbuilding combined with a long rooted past in offshore oil and gas and fishing, the maritime cluster in this region is a unique hub for skilled people. Furthermore, two thirds of the cluster members expect that the market development will affect their profitability positively. Market outlook for most markets cluster members deliver to is positive for the near future, such as offshore wind, oil and gas and cruise.

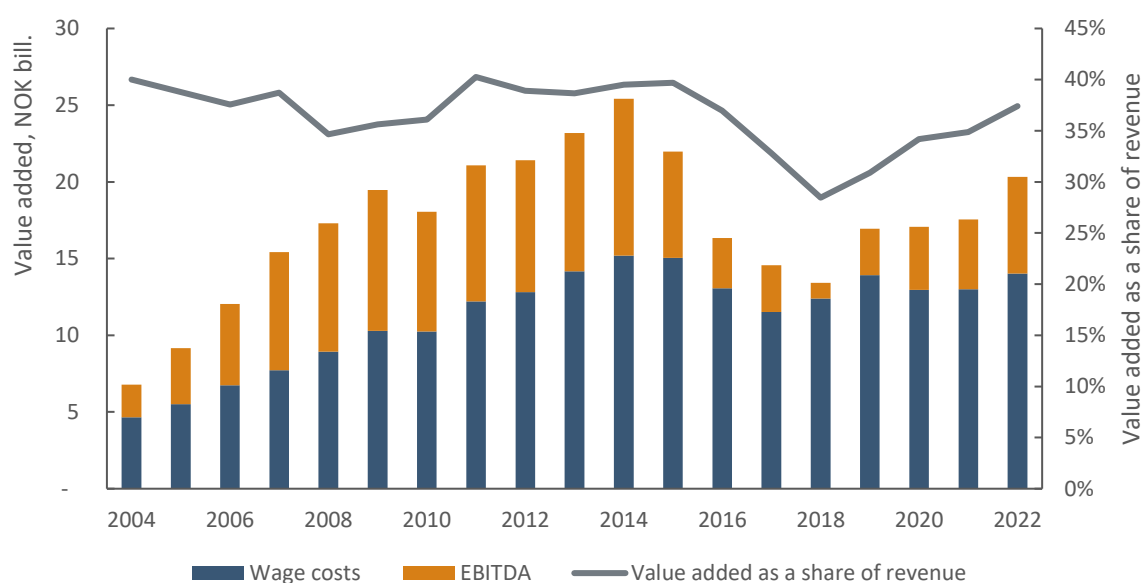
A continued growth in the value added – a significant increase since 2018

After experiencing a sustained decline in activity starting in 2015 due to the oil price drop and subsequent offshore crisis, the maritime companies in the Møre region began to see an improvement in overall value added starting in 2019. Over the period from 2018 to 2022, value added has surged by over 50 percent. We also note a growth in both wage costs and EBITDA³, but the main contribution to this recent development in value added can be largely attributed to the improvement in EBITDA. The increase in EBITDA suggests that the region's core operations are generating more income. This can result from increased sales, better cost management, or a combination of both.

² Menon (2022), [Kompetansebehov og kompetansestrategier som følge av teknologutvikling i maritim næring](#)

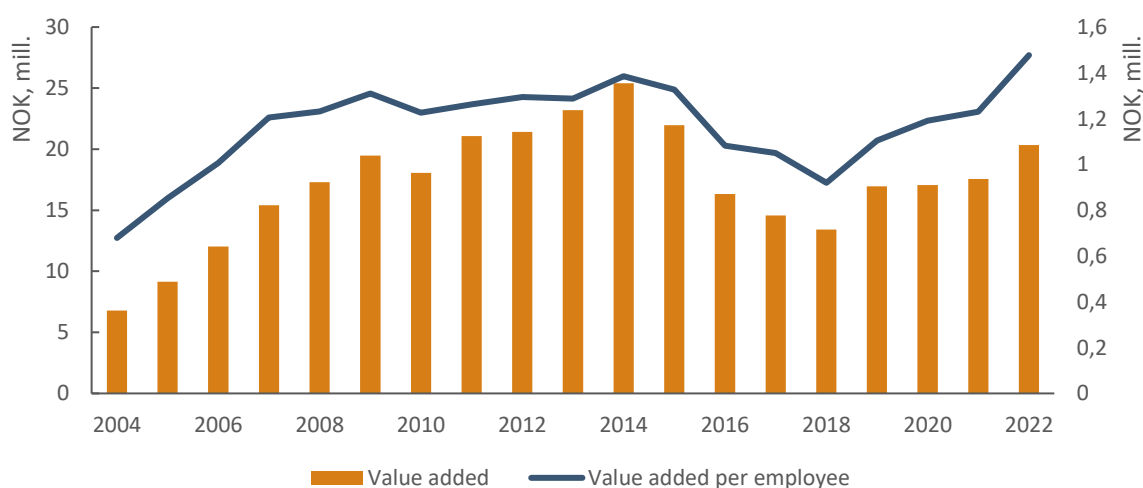
³ Earnings before interest, taxes, depreciation and amortization

Figure 8: Value added split by wage cost and EBITDA, and value added as a share of revenue. Source: Menon Economics



Considering the value added as a share of revenue, we note that this remained relatively stable at around 40 percent until the onset of the offshore crisis resulting in a substantial decline until 2018. Apart from a setback in 2020 due to the pandemic, value added as a share of revenue has been on an upward trajectory. The increase in EBITDA explains the positive development in the indicator. As of 2022, the indicator stands slightly lower than 40 percent. Although it has not fully recovered to its 2014-levels, there are signs of improvement and a return to its previous levels.

Figure 9: Productivity measured as value added per employee in the maritime industry in the Møre region. Source: Menon Economics

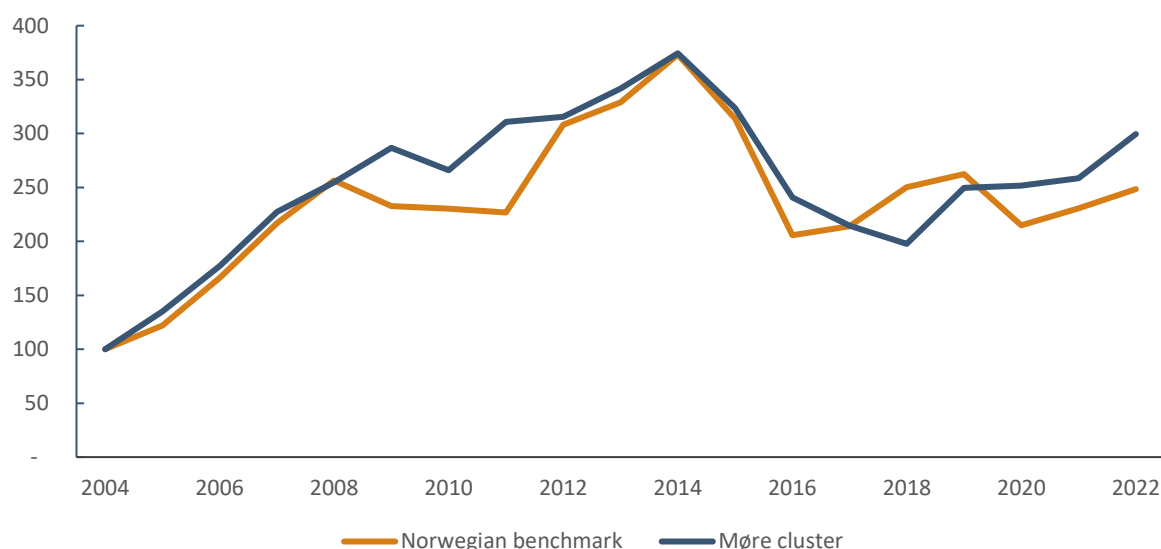


In the past year, labor productivity, measured by value added per employee, showed a significant increase, with a growth rate of 20 percent. Like last year's report, we observe that labor productivity increased at a higher pace compared to the overall increase in total value added of 16 percent from 2021 to 2022. The increase in productivity is a result of an increase in value added and a decrease in total employment in the region in 2022. The

increase in value added can be explained both with the improved EBITDA in the region and the exchange rate in Norwegian currency.

In the figure below, we have compared the value added in the Møre region to the national benchmark. We can observe a high level of correlation between the two. This tells us that the development in Møre and the benchmark is to a large degree driven by market characteristics.

Figure 10: Indexed development of value added for Møre region and the Norwegian benchmark⁴. Source: Menon Economics

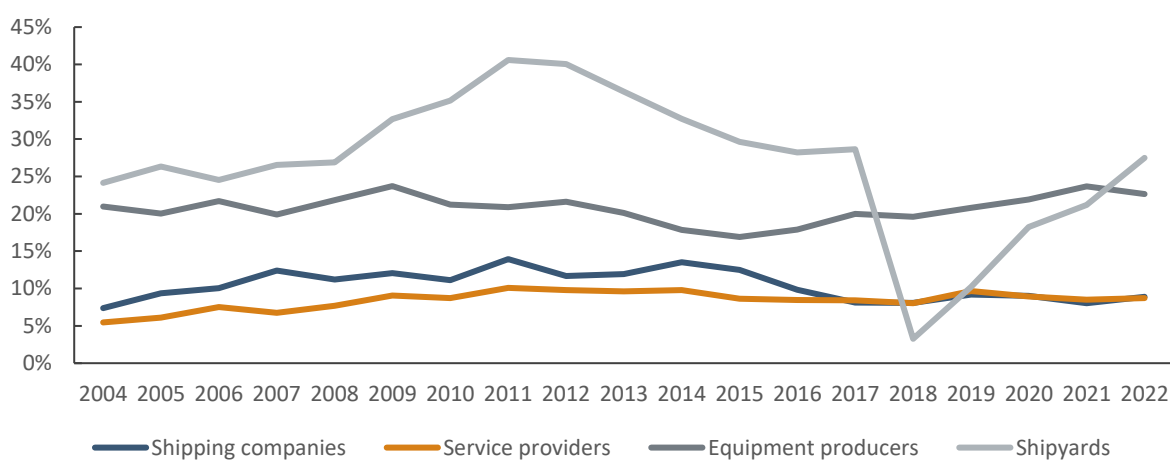


Due to the high correlation in the figure above, it is most interesting to analyze where the two graphs diverge. Both the companies in the Møre region and the baseline of similar companies in Norway performed exceptionally well in the period from 2004-2008. Value added more than doubled its size in this period. In the following three years, however, the Møre region continued the same trajectory with an annual growth rate of 7 percent and outperformed the Norwegian benchmark. Since 2011, the Norwegian benchmark has caught up and has been growing at a similar pace. By 2014, the national benchmark had caught up with the Møre region. After 2014, both the Møre cluster and the national reference have faced harsh market conditions, and the value added fell significantly in both groups. It is interesting to observe that they fell at a similar, significant pace in 2015 and 2016. In the period 2017 to 2019, however, the national benchmark outperformed the Møre region. This development was partly driven by the transition the maritime industry in the region had to go through. Especially shipyards in this region have gone through a big transition from the oil and gas industry to new segments such as ferries and cruise ships. While the transition was achieved, value added in the region experienced a sharp fall against the steep learning curve. From 2019 to 2022, the Møre region outperformed the national benchmark. A reason for this is that despite the pandemic and the decrease in shipbuilding activity in the ferry and cruise segment, the maritime industry in Møre region has a significant share of income that is related to aquaculture and fisheries. Increased activity in this segment has helped the industry in the region to recover from the aftermath of the pandemic.

⁴ Drilling equipment companies are taken out from both populations.

A more intuitive way of looking at the cluster's development compared to the domestic industry is to examine the cluster's share of the value added in the domestic maritime industry. This can illustrate the cluster's "market share" of the national maritime market. On an aggregate level, from 2004 until 2011 the cluster's share of the national value added increased from 9 to 15 percent. In the period towards 2018, this share has been falling, reaching a level of 9 percent. From 2018 to 2019 it increased to 11 percent, which is the same share as in 2021. Overall, the development has differed greatly between the four maritime groups over time, and it is therefore meaningful to look closer at the Møre region's share of the value added in the Norwegian maritime industry in each of the four maritime groups. This is shown in the figure below.

Figure 11: The Møre region's share of the value added in the Norwegian maritime industry – in each of the four maritime groups. Source: Menon Economics



There is substantial variation in the relative performance at the group level, as seen in the figure above. The most striking result is the Møre yards' value creation as a share of Norwegian yards. In 2011 and 2012, the Møre yards stood for more than 40 percent of the value creation in shipbuilding in Norway. This share gradually decreased the next four years before dropping to a low of 3 percent in 2017. The decrease was mainly driven by lower activity and high expenses for the biggest newbuild yards due to the transition from oil and gas to other market segments. This led to a negative EBITDA, being the main factor that caused the fall in value added. After 2018 Møre yards increased their share in Norwegian shipbuilding gradually by going over to new segments such as cruise and ferry, as well as by increasing the share of the aquaculture and fishery segment in the shipyards' activity. We see that as of 2022, Møre yards stood for almost one third of the value creation in shipbuilding in Norway. The rest of the revenues for shipyards are coming mainly from the Vestlandet area in Norway, followed by other coastal areas which have many small and middle-sized shipyards.

Looking at the shipping companies, their share in value creation peaked in 2014 at just below 14 percent. However, in the aftermath of the oil crisis Møre's share dropped significantly until 2018 to almost 8 percent. As the main activity for shipping companies in the region was within offshore oil and gas, Møre was hit harder by the decrease in the oil price compared to the rest of the world. After 2018 the shipping companies' share in the Norwegian maritime sector has stabilized and is as high as 9 percent in 2022. Strong offshore and aquaculture markets are contributing factors to the positive outlook. Equipment producers have also seen a decrease in their income following the oil price fall. However, we see that this group has recovered from this development more quickly than others, which is a result of the flexibility of the actors in this group. Equipment producers in Møre are diversified in the segments they work with, which makes them less vulnerable to changes in one market segment.

Export constitutes half of the cluster's revenues – Europe the most important export market

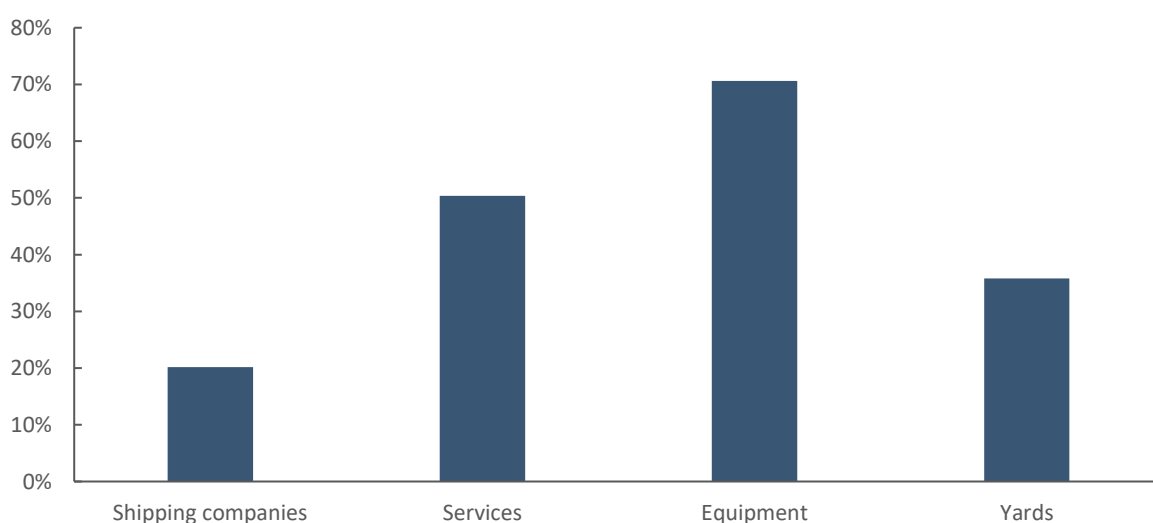
From a societal perspective, export revenues are not more valuable or of higher quality than revenues from other markets. Creating value and employment should always be the objective, regardless of whether the value creation and jobs are generated locally, nationally, or internationally. However, there are good reasons to pay special attention to export industries. The most obvious reason, but least important in the short term, is consideration for the trade balance. From a national perspective, the purpose of exports is to finance the import of goods and services demanded by the population. However, this is less important in the short term because we can finance imports through the export of oil and gas and through returns from the sovereign wealth fund.

For individual companies, the purpose of exports appears differently than it does for Norway as a nation. Companies will seek growth where the markets are, and Norwegian markets are often too small. When maritime companies from the Møre region succeed in international markets, it is because they have competitive advantages that attract export customers to choose to purchase goods and services from Norwegian companies. Another reason to focus on export opportunities is that success in export markets itself is an indicator of the competitiveness of business environments. A simple indication of this is that productivity is higher in export industries than in industries without exports, and productivity growth and export growth are positively correlated.

We can add a third reason, which from a regional perspective may be even more important: When maritime companies from the Møre region succeed in international competition, they contribute to building competence and capabilities that will spread to other industries and sectors through customer-supplier relationships, collaboration, and employee mobility. In this way, innovation capacity and productivity increase throughout the business community, not just within the export spearheads. This effect is further enhanced by the fact that success in large markets creates greater ripple effects than success in small markets.

In 2023, 51 percent of the cluster's revenue comes from export of good and services. This is quite similar to last year's export share which was at 48 percent. Despite an overall high export share, there are large differences in export shares among the four groups in the cluster. This is shown in the figure below.

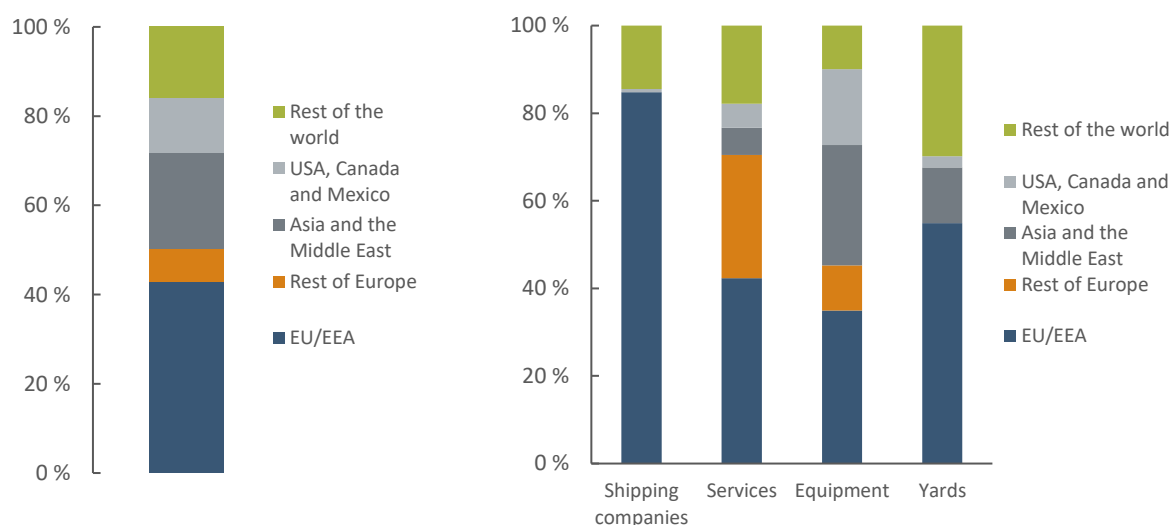
Figure 12: Estimated export shares for the four groups in the Blue Maritime cluster in 2023. N = 54



The equipment producers' export share in 2023 was around 70 percent, and thus the highest share out of the four groups. The equipment producers are well-positioned in the global market, especially in technological products. The service providers are the group with the second highest export share, equivalent to 55 percent in 2022. This is followed by shipyards, where more than 35 percent of the income comes from export activities. Finally, shipping companies in the Møre region have an export share of around 20 percent. The main segments shipping companies operate in in the Møre region are offshore and aquaculture. The aquaculture segment has witnessed a steady increase in export share, although most of its market remains domestic. The offshore segment, which is still dominated by oil and gas activity, is driven by the robust activity level on the Norwegian continental shelf in recent years⁵. This is characterized by new discoveries and ongoing field developments, which may have contributed to domestic operations taking precedence over exports. However, it is important to note that offshore wind is becoming an increasingly significant market segment for offshore shipping companies in the Møre region. Currently, almost all income streams related to offshore wind come from export activities as the offshore wind market is still in a development phase in Norway. Therefore, export income is expected to increase for offshore shipping companies in the region as the importance of offshore wind increases over time.

When looking at the companies' export markets, we find that the EU/EEA constitutes around 43 percent, as shown in the figure below to the left. This market is important for all four groups, especially for the shipping companies and the shipyards as shown in the figure to the right.

Figure 13: Left: Total export revenues of Blue Maritime cluster distributed by geographical region, 2023. Right: Export revenues distributed according to geographical regions for the four maritime groups. N=50



As can be seen from the figure on the left, even though EU/EEA is the most important export market, Asia and the Middle East is a close number two. Countries in the EU/EEA constitute 43 percent of the customers in terms of revenue, while countries in Asia and the Middle East stand for 22 percent. The US, Canada and Mexico constitute 12 percent of the export revenues, followed by the rest of the world with 16 percent.⁶

Asia and the Middle East are important markets especially for equipment producers as shown in the figure to the right above. Asian countries are known for their shipbuilding industries. Norwegian equipment producers deliver

⁵ [Norsk Petroleum \(2023\). Aktivitetsnivå på feltene.](#)

⁶ *We believe that part of this is export to the UK.*

a variety of equipment to different segments for ships being built in all regions, including Asia and the Middle East. Today, most of the global orderbooks are being built in Asia, and Norwegian suppliers of ship equipment have increased their exports of advanced vessels and offshore rigs to Chinese shipyards. The European market in total is the most important to the service suppliers. In recent years, there has been an increase in newbuilding activity within the merchant fleet, which provides large export opportunities for Norwegian companies.

There is reason to believe that the Møre region will maintain its position as an important export industry. Growth opportunities for the maritime industry are favorable, both in the domestic market and in export markets. The opportunities are particularly significant in relation to the green transition and smart technology/automation. Ferries, fast boats, and other coastal vessels will increasingly be built with zero-emission or low-emission machinery, and the industry in Møre and Romsdal is among the world leaders in zero-emission technology. A large part of the global short sea shipping fleet is old and will be replaced – increasingly with zero- and low-emission machinery. It is unlikely that the shipyards have the cost prerequisites to build these vessels, but designs and equipment can be supplied by the industry in Møre and Romsdal. In addition, the deep-sea fleet (large ocean-going cargo ships) represents an enormous market that the industry can position itself towards. Deep-sea shipping companies must reduce their carbon emissions, which provides opportunities for selling propulsion systems, smart technology, and other ship equipment. In addition, the offshore wind market is developing, and a number of new ships need to be built in order to meet the ambitions.⁷

Offshore wind has become the largest market segment

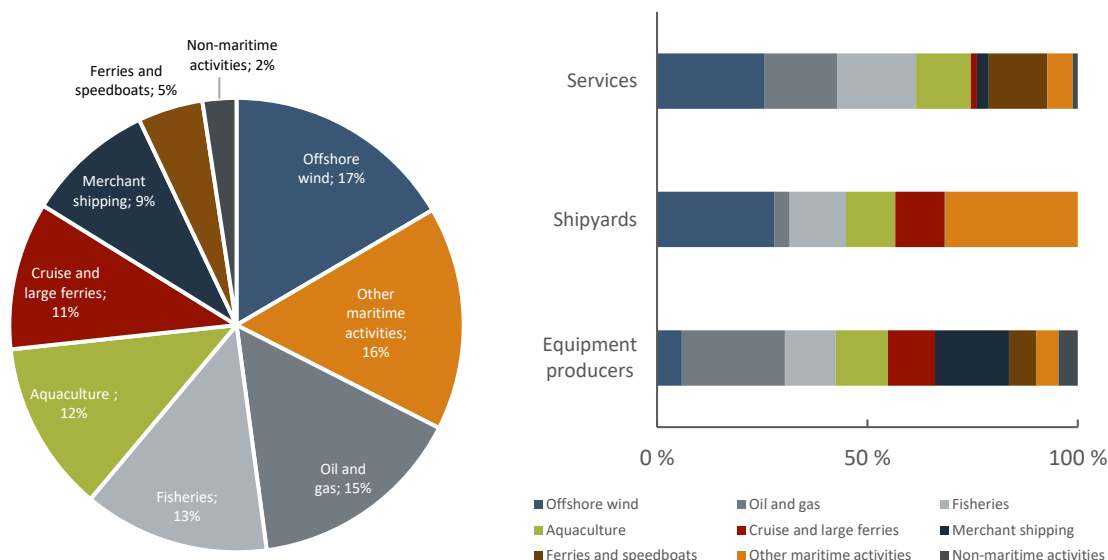
In this year's survey, the companies were asked to distribute their revenues on various ocean industries and non-maritime activities. The figures below show how the revenues are divided by market segments for the shipyards, equipment suppliers and service providers. These three groups of companies can readjust from one market segment to another, although they might face switching costs. The shipping companies, however, are to a large extent stuck within their market segments because the vessels are tailor-made for specific operations (for example carrying passengers on a ferry). Hence, shipping companies are not included in our analysis of market segments.

For the three groups, the offshore wind market constitutes 17 percent of the aggregated market in terms of revenue, an increase from last year's share of 13 percent. The results are mainly driven by revenue from shipyards and service providers. The second largest market is other maritime activities⁸, at 16 percent, followed by oil and gas. The oil and gas market has experienced a significant decrease in recent years, from a share of around 50 percent in 2017 to 15 percent in 2023. Revenues from the offshore oil and gas market are especially important for the equipment suppliers and the service providers. The offshore wind market is growing and there is a need to build more vessels to meet the government's ambitions related to Norway's market share in the offshore wind market. As seen in the figure below to the right, other maritime activities and the offshore wind market are especially important for the shipyards, where these markets constitute 60 percent of the shipyards' revenues in 2023.

⁷ Menon Economics (2020). Publication nr. 148/2020. Available [here](#).

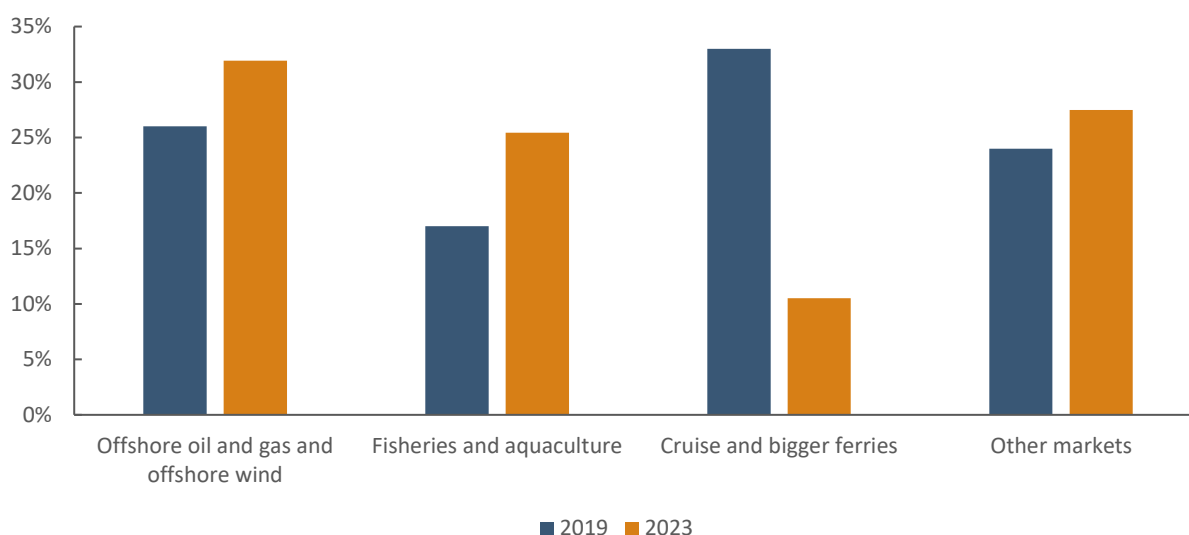
⁸ Includes deliveries to research, defense, leisure boats/yachts etc.

Figure 14: Revenue split by market segment for companies in the Blue Maritime cluster in 2023, based on survey results. Shipping companies are not included in the figure. (N=50). Source: Menon Economics



Since 2019, revenues from the offshore markets, the fisheries and aquaculture markets and other markets have increased, while revenue from the cruise and ferry market has decreased. This is shown in the figure below.

Figure 15: Revenue split by aggregated market segments for companies in the Blue Maritime cluster in 2019 and 2023, based on survey results. Shipping companies are not included. Source: Menon Economics



The activity level in building of cruise and bigger ferries was significant before 2020, as a consequence of both a significant effort to decarbonize the Norwegian ferries and fast ferries along the coastline and of increased newbuilding activity of cruise and expedition cruise in the Norwegian shipyards. This had a spillover effect for both service providers and equipment producers supplying the local shipbuilding industry in these segments. In 2023 however we see that the importance of cruise and bigger ferries has dropped significantly, as the pandemic hit this segment hard. On the other hand, the importance of aquaculture and fisheries as well as the offshore






market increased for the maritime industry in the Møre region. The increase in the offshore segment is a result of an increase in both the offshore wind segment and in oil and gas.

Key numbers for the four maritime groups

Shipping companies

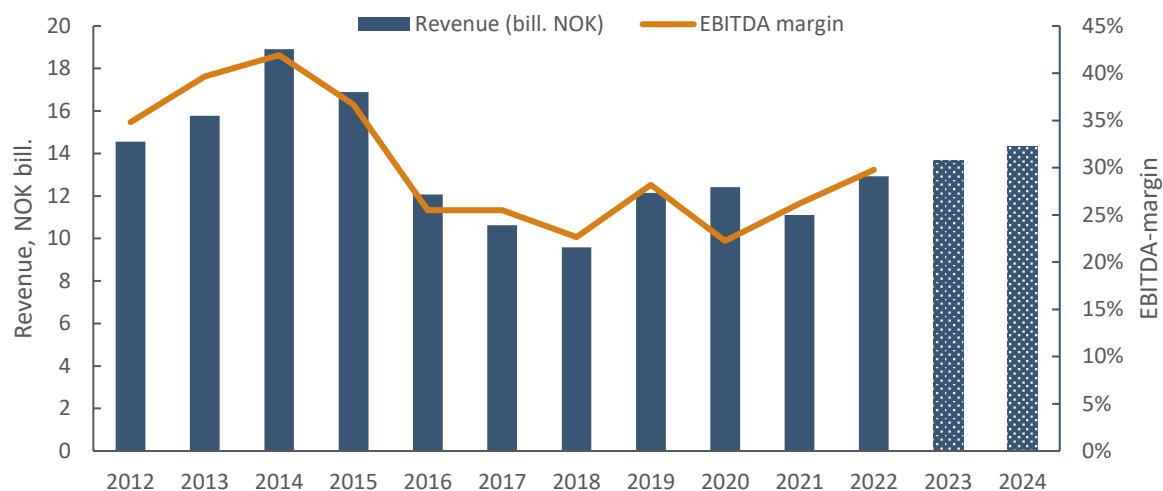
In 2022, the shipping companies operating in the Møre region experienced a notable increase in revenue, amounting to a growth rate of 16 percent, as seen in the table below. This signifies a significant improvement compared to the negative revenue change of -8 percent witnessed in 2021. Moreover, the value added by the shipping companies reached NOK 9.4 billion in 2022, reflecting a substantial growth rate of 20 percent compared to the preceding year. However, it is important to note that employment within the shipping sector declined by 3 percent, resulting in a total workforce of 4,000 individuals in 2022. On a positive note, the EBITDA margin exhibited an upward trend in 2022, driven by a concurrent increase in EBITDA.

Figure 16: Development in key economic indicators for the shipping companies, 2021-2022. Source: Menon Economics, 2023

		2021	2022	Shipping
	Revenue (NOK bill.)	11.1	12.9 +16%	
	Value added (NOK bill.)	7.8	9.4 +20%	
	Employment	4110	4000 -3%	
	EBITDA-margin	26%	30%	

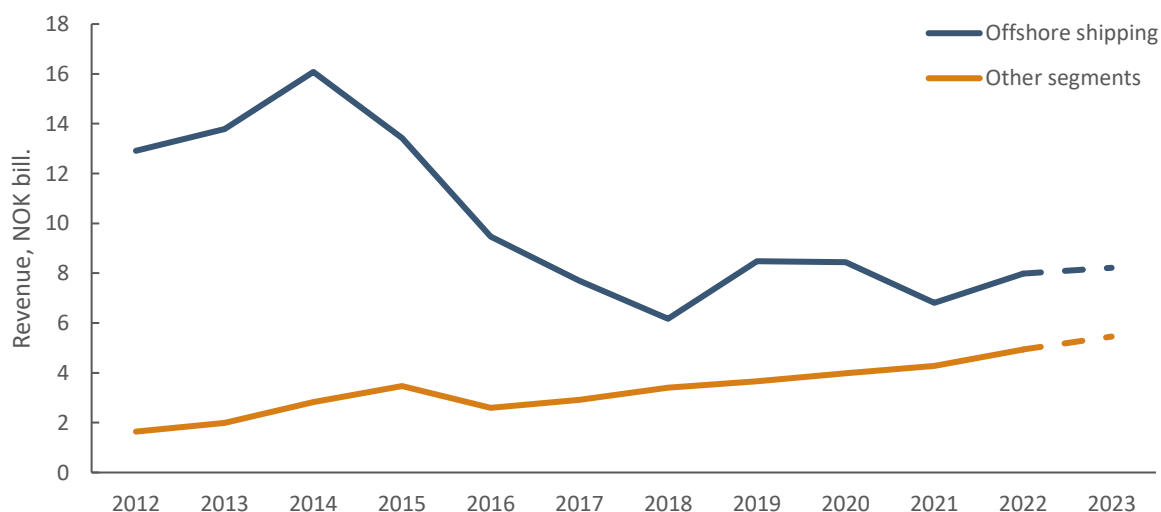
Based on the expectations of the shipping companies in the Møre region, the estimations show that revenues will continue to increase in both 2023 and in 2024, as seen in the figure below. This is mainly driven by the positive outlook in both the offshore oil and gas and the offshore wind segments. As the timeline for decarbonization goals is tightened, the importance of offshore wind is increasing, which creates a unique opportunity for offshore shipping companies in Norway that have activities in these markets. As of today, almost all of the offshore wind related income for shipping companies comes from abroad, which also contributes to the increase of export income for shipping companies.

Figure 17: Revenue and EBITDA-margin (earnings before interest, taxes, depreciation and amortization) among shipping companies in the Blue Maritime cluster from 2012 to 2022. Estimates of revenues in 2023 and 2024 are based on reported information from companies. Source: Menon Economics



The shipping companies in the Møre region can be divided into a number of groups in terms of their activities. These are offshore shipping companies, well boat companies and other aquaculture service companies, in addition to merchant shipping and passenger transport.⁹ However, the biggest share of income generation in the region comes from offshore shipping and wellboat companies. Throughout history, the offshore segment has held a prominent position among the shipping companies in the Møre region. It is still the largest segment measured in terms of revenue, but the trend in other segments shows a converging development, as shown in the figure below.

Figure 18: Revenues of the two main shipping segments in the Møre region from 2012 to 2022. Estimates of revenues in 2022 and 2023 based on reported information from companies. Source: Menon Economics



⁹ Møre and Romsdal has a significant fishing vessel fleet. Its revenues are not included here since it is impossible to split revenues between maritime operations and sales of fish.






The offshore oil and gas market faced significant challenges in the aftermath of the fall in oil prices, resulting in a substantial decline in revenues of more than 50 percent between 2014 and 2018, as shown in the figure above. In contrast, other segments within the shipping industry demonstrated a more positive trajectory over the same period, experiencing growth and gaining importance in the overall sector. This group is mainly driven by well-boat companies and shipowners serving the aquaculture industry.

In 2022, 39 percent of the income of Møre's shipowners was related to non-offshore segments, while a significant 61 percent was related to offshore shipping. The offshore shipowners have experienced a 17 percent increase in their income from 2021 to 2022. Further on, the short-term outlook for the offshore segment is positive. According to the survey we have conducted among Blue Maritime cluster members, offshore shipowners are expecting a 3 percent increase in their income in 2023. This is both a result of increased oil prices and increased demand for offshore supply activities on the Norwegian continental shelf, and an increase in activity level when it comes to offshore wind. Looking at the rest of the shipowners, it is mainly the well boat companies that are driving the development. These companies' income is dependent on the number of fish being carried and the amount of processing that is done on board. These metrics are expected to be stable in the following years, which makes the expectations for this sub-segment stable and in line with the historical development.

Shipyards

In 2022, the shipyards in the Møre region experienced a small decrease in their revenues, equivalent to a 2 percent decline, as seen in the table below. Shipyards had already experienced a 3 percent decrease in their revenues between 2020 and 2021 as well. On the other hand, the value added for the shipyards reached NOK 1.7 billion in 2022, reflecting a substantial growth rate of 30 percent compared to the preceding year. This is almost entirely a result of improved EBITDA for shipyards, as EBITDA is now no longer negative for this group after 5 years. This can also be seen in the EBITDA margin which exhibited an upward trend in 2022, ending at slightly above zero percent. Employment for this group has decreased by 5 percent, resulting in a total workforce of 2200 individuals in 2022.

Figure 19: Development in key economic indicators for the shipyards, 2021-2022. Source: Menon Economics, 2023

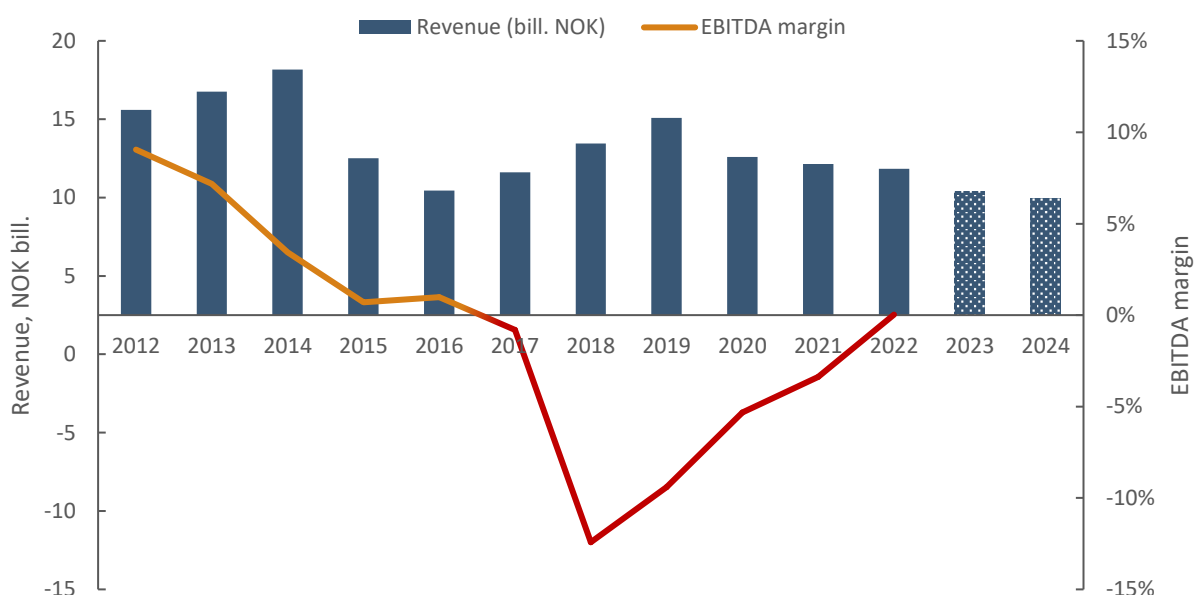
		2021	2022	Shipyards
	Revenue (bill. NOK)	12.1	11.8 -2%	
	Value added (bill. NOK)	1.3	1.7 +30%	
	Employment	2340	2220 -5%	
	EBITDA-margin	-3%	0%	

The shipyards in the Møre region have traditionally played a significant role in the shipbuilding industry in Norway, primarily serving the oil and gas sector. However, the onset of the offshore crisis resulted in a considerable decline in revenue as ship owners refrained from contracting offshore vessels. In response to this decline, the shipyards shifted their focus towards expedition cruises, ferries, and aquaculture vessels. The orientation towards diversified segments led to a gradual recovery of revenues between 2017 and 2019. However, this transition also incurred significant costs resulting in a loss in profitability for the shipyards as

displayed in the trajectory of the EBITDA margin. However, there have been signs of improvement in profitability. The shipyards' EBITDA margin has been steadily increasing from a negative value and reached a breakeven point of zero in 2022. This has resulted in a notable growth of 30 percent in value added from 2021 to 2022, showcasing a modest recovery in the shipyards' financial performance.

Unfortunately, the outbreak of the COVID-19 pandemic further compounded the challenges faced by the shipyards, particularly within the expedition cruise segment. This led to an abrupt halt in cruise ship contracting activities and a marked decrease in overall shipyard activity. Consequently, the shipyards in the Møre region experienced negative revenue growth and a corresponding fall in employment. For instance, total revenues decreased from NOK 13.4 billion in 2019 to NOK 11.8 billion in 2022. Based on the survey we have conducted with the shipyards that are members of the Blue Maritime cluster, expected revenue for 2023 and 2024 is slightly lower than 2022 levels. The estimations show that revenue will decrease in both 2023 and in 2024, as seen in the figure below.

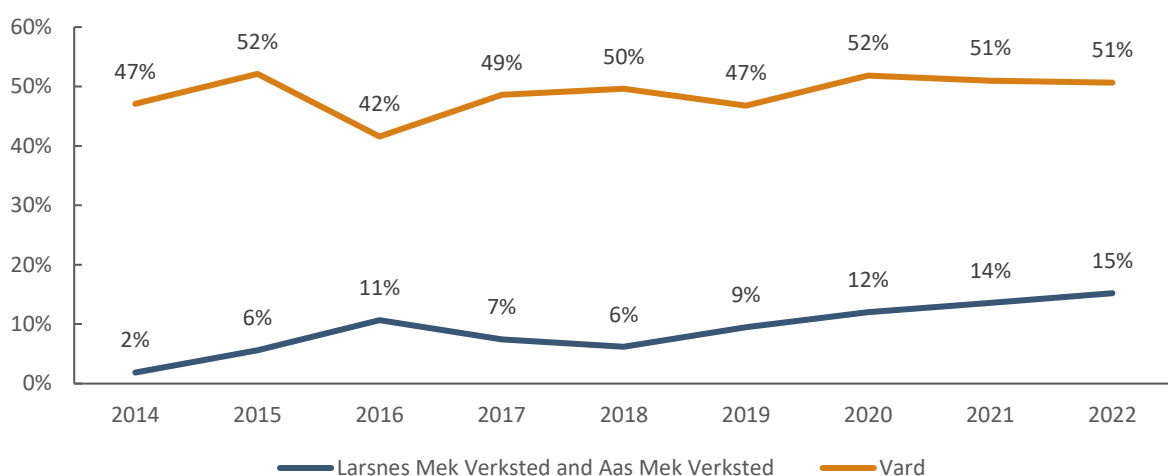
Figure 20: Revenue and EBITDA-margin (earnings before interest, taxes, depreciation and amortization) among yards in the Blue Maritime cluster from 2012 to 2020. Estimates of revenues in 2023 and 2024 based on reported information from companies. Source: Menon Economics



Shipyards in the Møre region had to go through an extensive transition in the aftermath of the oil price fall in 2014. While the majority of big newbuild yards have historically focused on building advanced offshore vessels, the oil price fall has caused a significant decline in activity for these yards. The market was characterized by oversupply for several years, as the activity level was too low to create demand for newbuilds. Vard and Ulstein are examples of shipyards that had to go through this change. Looking more closely at Vard group, the figure below shows that Vard has stood for around half of the total income of shipyards in the Møre region since 2014. This share has stayed stable over several years, which indicates that the yard kept its position in the region despite the demanding transition from mainly building offshore service vessels to building passenger ferries and cruise ships after 2016.

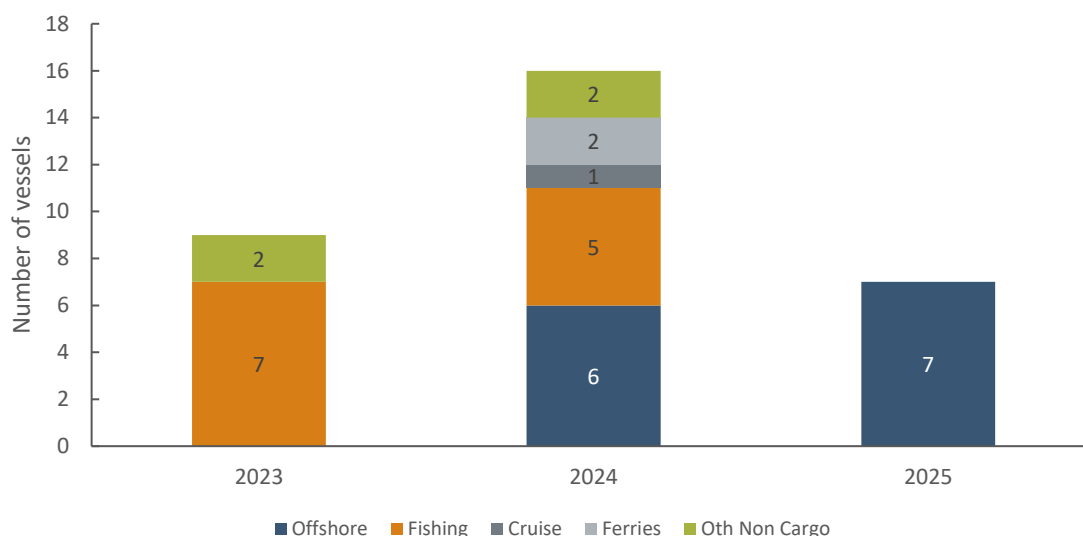
Another important segment for shipyards in the Møre region has been fisheries and aquaculture. However, after the oil and gas crisis, the relative importance of this segment increased even more. Two examples of shipyards that focus on these segments are Larsnes Mek Verksted and Aas Mek Verksted. These yards have built live fish carriers, trawlers or other types of aquaculture supply and fishing vessels over several years. Looking at the figure below, we can see that while these two shipyards accounted for only 2 percent of the Møre region's shipyards' total income in 2014, their share went up to 15 percent in 2022. Increased activity levels in the aquaculture industry combined with demand for vessels that can perform complex and specific operations have created a significant stream of revenues for shipyards in the region.

Figure 21: VARD group's income as a share of total income of Møre shipyards, compared to income for Larsnes and Aas Mek Verksted. Source: Menon Economics



The importance of the fishing and aquaculture segment is persistent also in the orderbooks, as shown in the figure below, where seven out of ten vessels in the Møre shipyards' orderbooks in 2023 are vessels related to fisheries and aquaculture. However, looking ahead at the orderbooks for 2024 and 2025, offshore vessels are dominating. This is mainly vessels related to the offshore wind market.






Figure 22: Orderbooks of Møre shipyards. Left: Number of vessels and vessel types in orderbooks. Source: Clarksons World Fleet Register



Equipment suppliers

The equipment suppliers in the Møre region witnessed a notable upswing in revenues, demonstrating a growth rate of 13 percent from 2021 to 2022. This positive trajectory aligns with the projections outlined in last year's report, which anticipated a revenue growth of 13.3 percent for 2022. Specifically, the total revenue generated by these suppliers amounted to NOK 19.3 billion in 2022, indicating a significant increase from the NOK 17.2 billion recorded in the preceding year. Furthermore, the equipment producers have experienced an improvement in profitability, exemplified by a steady increase in profit margin since 2016. However, employment decreased by 1 percent, with a total of 4,440 individuals comprising the workforce in this sector in 2022.

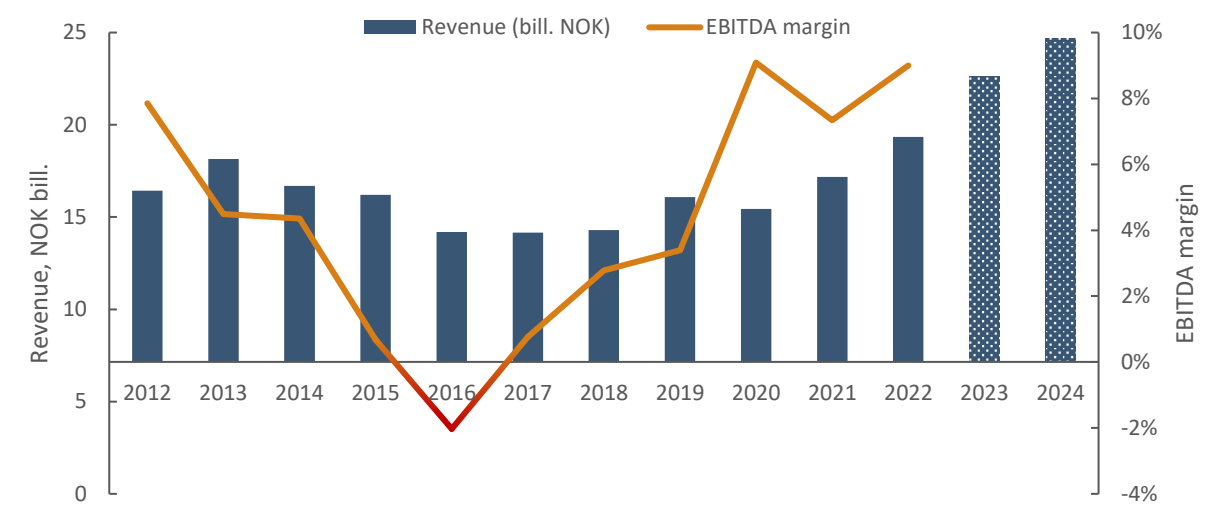
Figure 23: Development in key economic indicators for the shipyards, 2021-2022. Source: Menon Economics, 2023

		2021	2022	Equipment suppliers
	Revenue (NOK bill.)	17.2	19.3 +13%	
	Value added (NOK bill.)	5.2	6 +15%	
	Employment	4500	4440 -1%	
	EBITDA-margin	7%	9%	

Like all parts of the cluster, equipment suppliers also experienced a significant decrease in activity levels and profitability in the aftermath of the oil price fall in 2014. Revenue decreased significantly until 2016, while EBITDA-margins fell to a low point of -2 percent in 2016 – in large part driven by a few big companies. However, the situation for the equipment producers in the region has been improving since 2018 and the trend is expected to continue in the coming years as well. The outlook for the equipment producers is quite positive according to

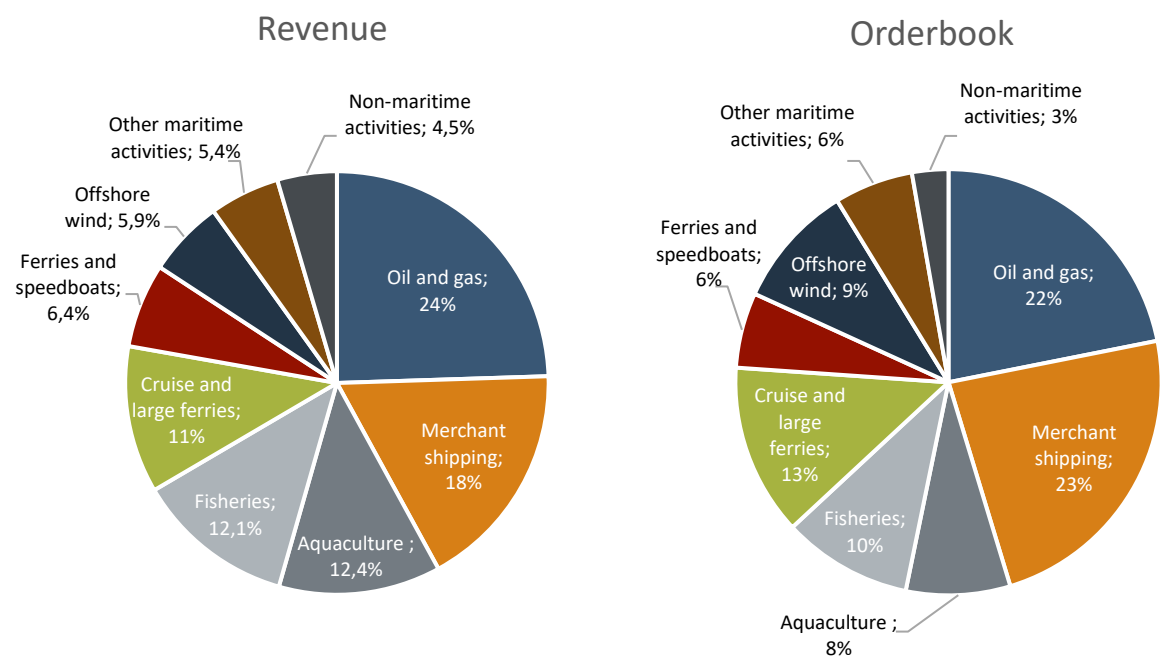
the survey we have conducted with the cluster members. Equipment producers expect an increase of up to 17 percent in their income levels in 2023. This increase is expected to continue also in 2024.

Figure 24: Revenue and EBITDA-margin (earnings before interest, taxes, depreciation and amortization) among equipment producers in the Blue Maritime cluster from 2012 to 2020. Estimates of revenues in 2023 and 2024 based on reported information from companies. Source: Menon Economics



Equipment suppliers in the Møre region have quite diversified portfolios and serve a broad range of segments. The figure below shows how equipment producers’ income was distributed by market segments in 2023, and how their orderbooks’ value is distributed into market segments. The most important market in terms of revenues in 2023 is the oil and gas sector, as shown in the figure below to the left. On the other hand, merchant shipping stands for the largest share of the equipment producers’ orderbooks, as shown in the figure below to the right.

Figure 25: Revenue by market segments for the equipment suppliers in the Blue Maritime cluster in 2023. Source: Menon Economics











As can be seen, the income distribution in 2023 shows that deliveries to the oil and gas sector have been the most important income source for equipment producers in the region, followed by deliveries to the merchant shipping segment. As vessels from this segment are not built in Norwegian shipyards, income from this segment comes mainly from export. The relative importance of this segment has increased in recent years as the global newbuilding activity has taken off. Traditional shipping is followed by aquaculture and fishing and other segments. Looking at the orderbooks of equipment producers, we see that merchant shipping comes up as the most important segment for this group – with 23 percent of their orderbooks tied to this segment. This is followed closely by the oil and gas market with 22 percent, and later fisheries, aquaculture and other segments. The current composition of orderbooks suggests that the equipment producers in the Møre region will continue to stay diversified in their deliveries in the near future.

Service providers

The service providers encompass a wide range of businesses that provide services to a diverse set of clients. The service providers in the Møre region witnessed an increase in revenues from 2021 to 2022 equivalent to 4 percent. The value added also increased, however only by 1 percent. In other words, it remained relatively stable. On the other hand, employment has decreased by 7 percent, with a total of 3100 individuals comprising the workforce in this sector in 2022. The service providers’ profitability has remained quite stable, where the EBITDA-margin in 2022 was 7 percent.

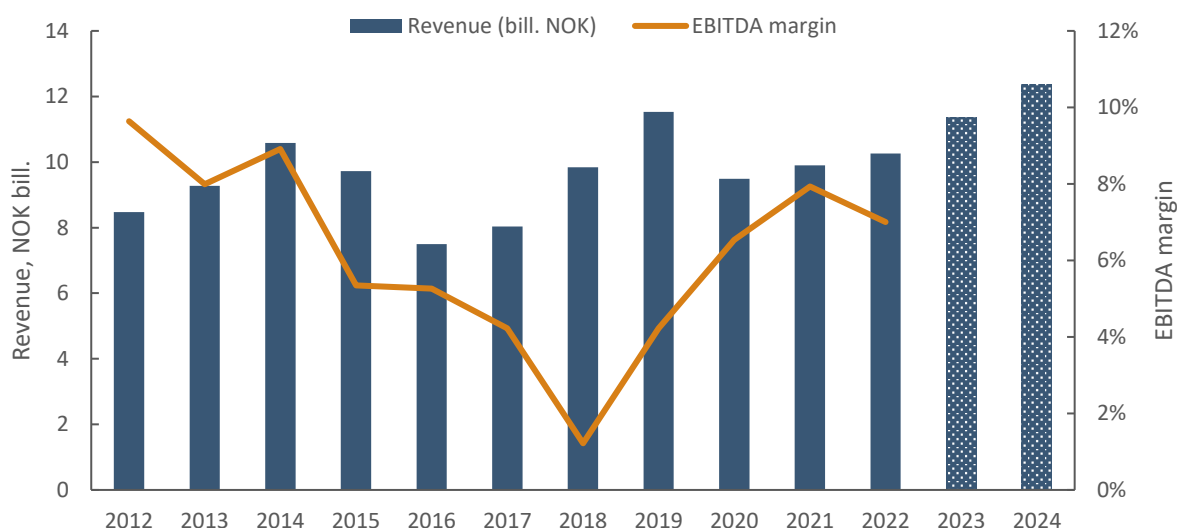
Figure 26 : Development in key economic indicators for the shipyards, 2021-2022. Source: Menon Economics, 2023

		2021	2022	Service providers
	Revenue (NOK bill.)	9.9	10.3 +4%	

	Value added (NOK bill.)	3.2	3.3 +1%	   
	Employment	3320	3100 -7%	
	EBITDA-margin	8%	7%	

A large share of the service companies' activity is connected to the yards. Consequently, the revenue trajectory of the service providers is closely tied to that of the shipyards. Thus, the service providers were correspondingly impacted by the offshore crisis, during which aggregated revenues within the group witnessed a decline of nearly 30 percent between 2014 and 2016. As with the shipyards, the outbreak of the pandemic posed additional challenges for the service providers, affecting their ability to generate revenue. Following the challenging year of 2020, the revenue of the service sector in the Møre region has shown a gradual increase and it is expected to further increase in both 2023 and 2024. This development is shown in the figure below.

Figure 27: Revenue and EBITDA-margins (earnings before interest, taxes, depreciation and amortization) among maritime services providers in the Blue Maritime cluster from 2012 to 2024. Estimates of revenues in 2023 and 2024 based on reported information from companies. Source: Menon Economics



Maritime service providers play a key role in the green transition

The transition from using fossil fuels to low- and zero-emission solutions has the potential to create significant changes in the structure of the maritime value chains, creating room for new market positions. Development of new business models is therefore a key task in achieving sustainable development for the shipping industry and the entire maritime sector. This is also the case for the service providers. As mentioned earlier, several of the companies in this group are closely connected to the shipbuilding yards. Hence, they will also play an important role in a time where the yards are to build ships that can sail on different fuels than today.

The introduction of hybrid and electric propulsion solutions, and with it the increased complexity in ships' power management systems, has driven the market for system integration in newbuilding. Historically, there have been

two main paths of entry into system integration. The first one is hardware/OEM suppliers and the second one is electric installers and service providers. Traditionally the yards and their electric installers were what you could call system integrators. This model was disrupted by diesel electric systems in offshore and ferries in the late 1990s. As systems have become more advanced, system integration has grown as its own discipline and market. In addition, some players with a background in software and ship design have moved into this market.

The development of the market for maritime (hybrid) propulsion solutions has led to some market players having system integration as their main business. In a report by Menon (2023)¹⁰, system integration has been deconstructed into four different ‘jobs’ that all need to be solved by the system integrator, in order to understand the system integrator’s role. These jobs can be conducted by the system integrator itself or be outsourced to others. The integrator will however need to coordinate all these functions. The individual ‘jobs’ are described in the following:



Hardware A hybrid propulsion solution depends on a wide range of physical equipment. In addition to conventional equipment, vessels with hybrid propulsion solutions are equipped with battery packs, specialized heat exchangers, switchboards, inverters and converters, various sensors and an extensive length of cables. The **system integrator** does not need to be the producer or supplier of all this equipment but has the key function of integrating all the equipment into the overarching system.



Software Data collected by sensors on a range of different hardware is used to monitor and control equipment (e.g. engines, propulsion, steering, cooling systems equipment on deck) on board the vessel. All these different ‘equipment specific’ software systems can be viewed as sub-systems, whereas the **system integrator** integrates all these different sub-systems into an overarching system. These overarching software solutions are known as Integrated Automation Systems (IAS) and coordinate all the different sub-systems into one interface that lets the crew monitor and control them in a simple way



Ship design Compared to conventional propulsion solutions, hybrid solutions need more space for hardware. Additionally, the increased complexity and performance requirements of hybrid solutions makes the specific location of hardware more important. Consequentially, the energy design needs to be considered in the overall design of the ship – from drawing up the hull to the finalization of the ship design. The extent to which **system integrators** stress that close and good relations to ship designers are a key feature in order to be competitive underlines the importance of ship design in the delivery of system integration services.



Installation and service The installation of all necessary hardware and software needs to be done or overseen by the **system integrator**. A significant part of the system integration service is also the commissioning of the vessel once put to sea. Within this ‘job’ we also include the monitoring of installed systems and regular maintenance and updating of installed equipment and software.

¹⁰ <https://www.menon.no/wp-content/uploads/2023-2-System-integration-of-green-propulsion-solutions-1.pdf>



System integration *Integrating all sub-systems so that these can interact with each other and be presented to give an entire picture of the vessel at any point in time. A system integrator supplies advisory services in the design of a ship and connects all necessary hardware and sub-systems to an overarching software system to be monitored and controlled by crew members and potentially remotely*

The Møre region has companies present in each of the four groups described above, especially related to ship design. Some examples are: Vard Electro (installation and services), Ulstein (ship design), Skipsteknisk (ship design), HAV Design (ship design), Sirius, Kongsberg Maritime (software) and Siemens (Hardware).

Research, development and innovation (RDI) within the cluster

In today's fast-paced and competitive global landscape, innovation stands as the cornerstone of economic progress and societal advancement. Businesses, research and development are essential drivers of innovation, propelling companies towards new discoveries and revolutionary technological advancements. RDI is not just about progress; it is a key driver that helps companies stay competitive in the market. Embracing research, development and innovation can be essential for a company's growth and survival. This approach involves efficiency improvements, cost reductions, differentiation, and the first mover advantage, all while ensuring long-term relevance both domestically and on a global scale.

A commonly used theoretical framework to explain research, development and innovation in various fields is the technology push framework. Technology push refers to developing and bringing new technologies to the market through research and development or production and sales activities. In this model, RDI activities follow a linear process where research leads to development, which in turn leads to innovation. It assumes that scientific research generates new knowledge, which is then developed into practical applications. These applications are in turn transformed into marketable innovations. However, it is not often the case that RDI activities follow a straight path. The triple helix model explains the dynamic interaction between academia, industry and government, and emphasizes the fact that innovation often emerges from interaction between the three rather than following the straight path as mentioned above¹¹. This interaction is thought to foster economic and social development, and highlights the existence of bilateral interactions between universities, industry and government.

A mapping of current RDI activities in the cluster

Government initiatives can support RDI activities in several ways, including funding mechanisms and incentives or programs to encourage RDI collaboration. The different government initiatives cover different phases of the technology development process. An effective support system consists of robust funding mechanisms for the entire value chain, from basic research and competency development, through applied research and development, to testing and demonstration of solutions, and commercialization¹². The textbox below gives a short explanation of how these activities are funded, and which themes are supported by the different programs.

Innovation Norway (Innovasjon Norge) is a state-owned company intended to stimulate entrepreneurship in Norway. The purpose of Innovation Norway is to be the state's and county municipalities' tool for realizing value-creating business development throughout the country. The main goal of Innovation Norway is to trigger financially and socially profitable business development and exploit the economic potential of different regions.¹³

The Research Council of Norway (Norges forskningsråd) is a Norwegian government agency whose purpose is to invest in research and innovation projects on behalf of the government. The council has the responsibility of promoting basic and applied research and innovation.

¹¹ *The triple helix: Henry Etzkowitz & Loet Leydesdorff. THE TRIPLE HELIX---UNIVERSITY-INDUSTRY-GOVERNMENT RELATIONS: A LABORATORY FOR KNOWLEDGE BASED ECONOMIC DEVELOPMENT. EASST Review 14 (1995, nr. 1) 14-19*

¹² Maritim21. Available [here](#)

¹³ Innovasjon Norge (2023). Available [here](#)

Enova is a state-owned company whose purpose is to promote the development and use of new energy and climate technology. To be eligible for funding, the company must be registered in Foretaksregisteret (the Norwegian Register of Business Enterprises), and the project must be carried out in Norway or within the Norwegian economic area. Projects can also be supported if a ship is registered in the Norwegian International Ship registry or the Norwegian Ordinary Ship registry. Ships sailing under other flags may also qualify if at least one third of the ship's port calls are to Norwegian ports, or the ship operates at least one third of the time in Norway and/or within the Norwegian economic area.¹⁴

SkatteFUNN is a tax deduction scheme for research, development and innovation efforts in the business sector. SkatteFUNN allows companies to deduct 19 percent of the costs incurred in a research and development project. To be eligible for the scheme, the company must develop a new or improved product, service, or production process through a dedicated R&D project. The company must further be liable to pay corporate tax in Norway.¹⁵ Unlike other schemes, SkatteFUNN is a rights-based scheme, which means all companies that satisfy the award criteria are entitled to support.

GCE Blue Maritime is a complete and world leading cluster within design, construction, equipment and operation of advanced vessels. Clusters are known to promote research, development and innovation due to pooling of resources, expertise, and knowledge. Clusters can facilitate environments where firms, research institutions and other stakeholders work together to develop new products or processes or improve existing ones. Firms in clusters benefit from easier collaboration, exchange of ideas, and joint research initiatives due to their geographical proximity.

Data from various support schemes and initiatives provide a comprehensive view of a company's efforts in research, development, and innovation. This can be valuable in assessing how the company contributes to innovation and its ability to develop new products, services, or solutions. The figure below illustrates the development in the number of projects Møre companies have received support for, sorted by different policy and incentive programs¹⁶. The number of projects – excluding SkatteFUNN projects – is at a peak in 2021¹⁷.

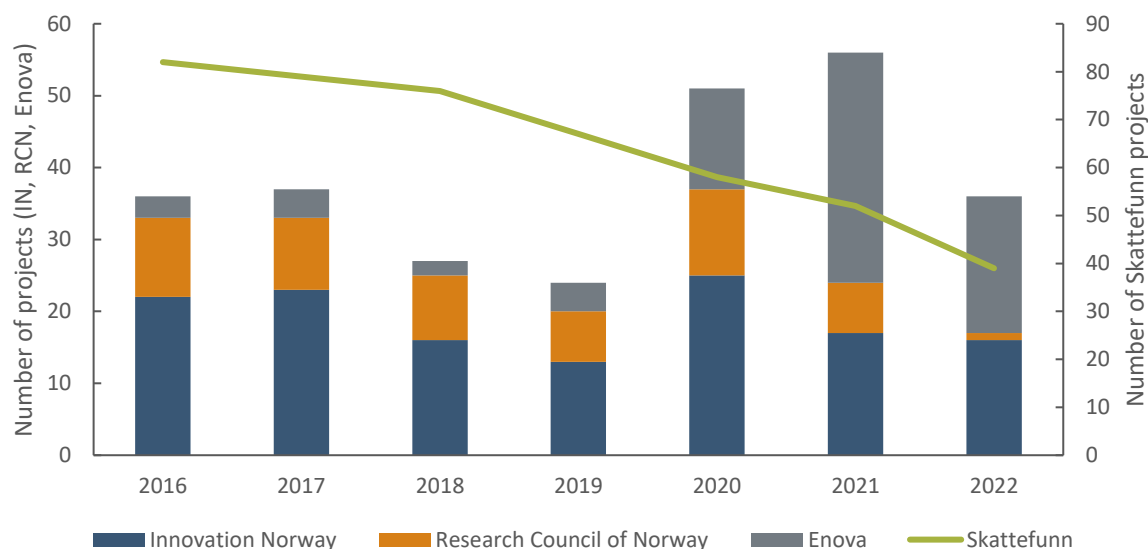
¹⁴ Enova – informasjon og generelle krav.

¹⁵ The Research Council of Norway, 2023. Available [here](#)

¹⁶ We have excluded certain types of funding from the analysis. For the Innovation Norway data this includes grants for regional development, extraordinary measures, clusters and networks, agricultural grants, as well as district-focused start-up grants. We have also excluded low-risk loans and risk loans and guarantees. From the Enova data we have excluded grants related to housing, facilities, construction, and real estate.

¹⁷ Support from Innovation Norway primarily consists of innovation grants. Support from Enova includes funding for initiatives such as battery installations in vessels, electrification of maritime transport, and support for land-based power installations. Support from the Norwegian Research Council largely comprises funding for innovation projects in the business sector, as well as project establishment support.

Figure 28: Number of projects from different government initiatives, including Skattefunn projects, for companies in Møre and Romsdal, 2016–2022. Source: Innovation Norway, Enova, Research Council of Norway, Menon Economics

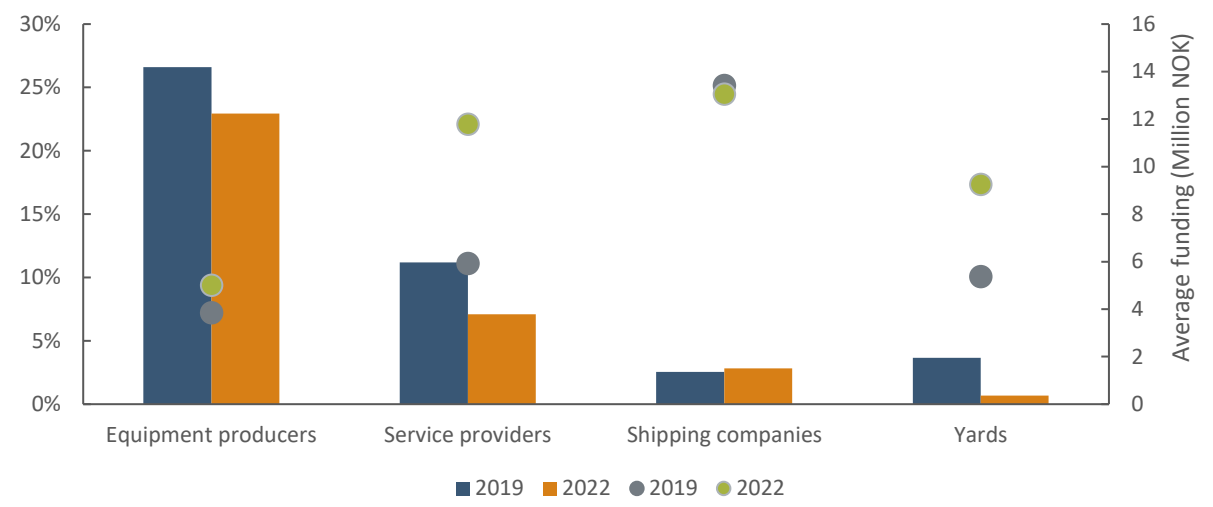


Enova projects contribute to 25 percent of the total amount of projects in 2022, as shown in the figure above. There is no evident trend in projects funded by Innovation Norway or the Research Council of Norway. There has been a relatively large fall in the number of projects funded by Enova and the Research Council of Norway from 2021 to 2022. As is evident from the figure above, the number of companies with an active Skattefunn project in a given year has declined over time. It is important to note that this trend is not specific to the maritime industry. There has been a decline in the number of applications for Skattefunn overall. The Research Council of Norway explains that the reason for the development may be complex, but the effects of the pandemic, delays in ongoing projects as well as a decrease in prioritization of research and development play an important role¹⁸.

The different groups within the maritime industry have varying levels of technological advancement, and hence different innovation potentials. Understanding the distribution of support between the groups provides insight into whether the policies are effectively targeting the different companies. When looking at the figure below, we find that equipment producers is the group with the highest share of companies receiving support from the different initiatives out of the four maritime groups. However, shipping companies is the group where the average funding amount is the highest.

¹⁸ The Research Council of Norway, 2023. Available [here](#)

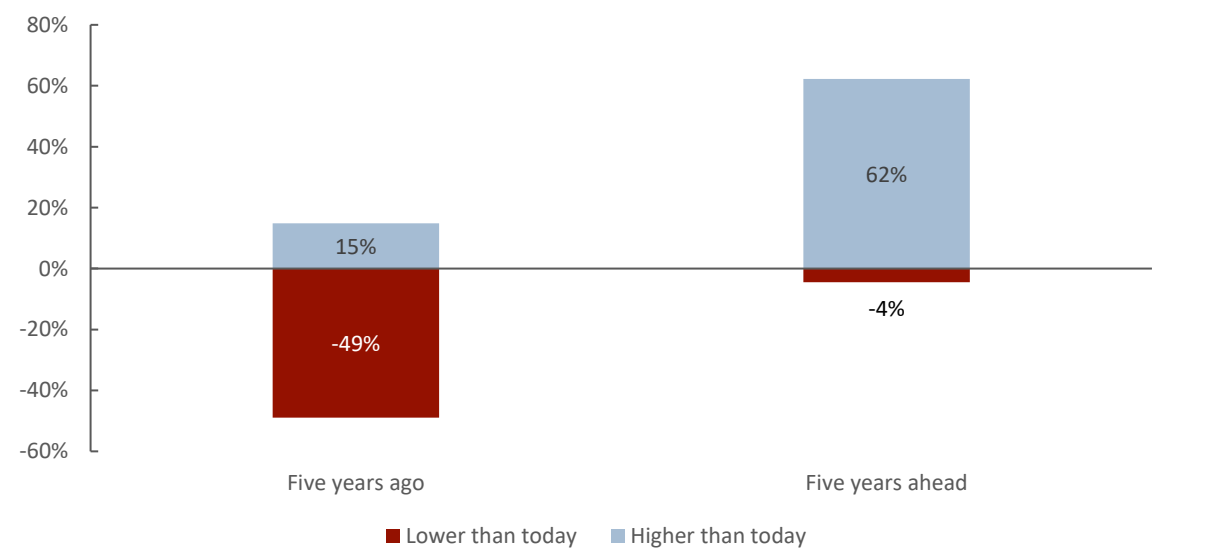
Figure 29: Share of maritime companies in Møre and Romsdal that have received support from at least one of the policy/incentive programs, and average support, by group. Bars = Share of companies, dots = Average funding. Source: Innovation Norway, Enova, the Research Council of Norway, Menon Economics



In 2019, 27 percent of the equipment suppliers in the cluster received support from at least one of the policy/incentives programs. In contrast, only 3 percent of shipping companies in Møre received support during the same year. There has nevertheless been a decline in the share of companies receiving support from 2019 to 2022 for all groups except for shipping companies. Notably, the shipyards as a group have the smallest share of companies receiving support.

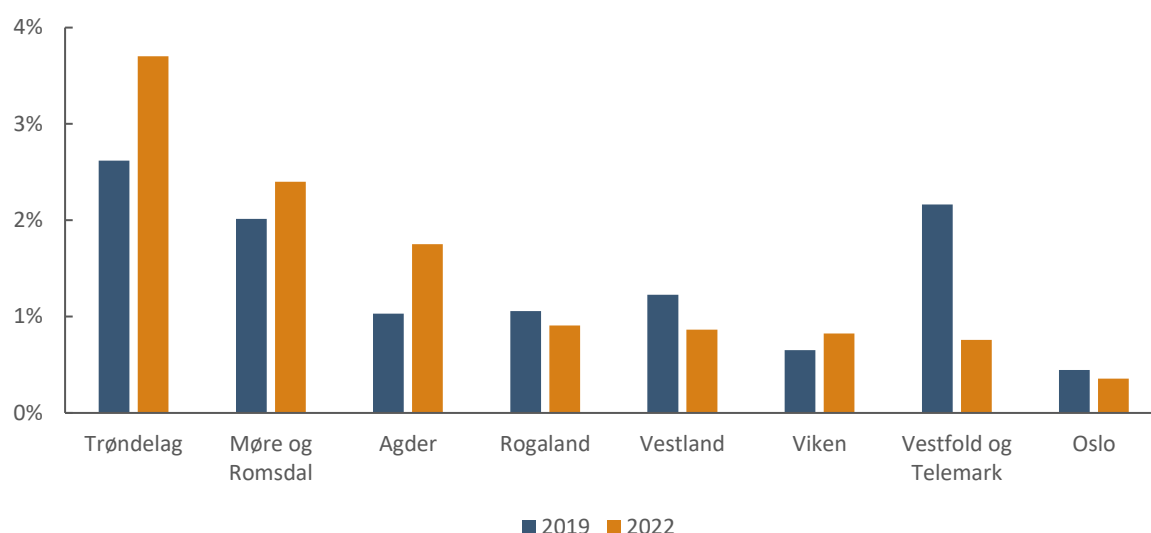
The survey conducted among cluster members indicates that half of the companies experience a higher level of research, development, and innovation activities today compared to five years ago. Furthermore, 62 percent of the companies anticipate an even higher level of RDI activities five years into the future. This suggests that these companies have a positive outlook on the trajectory of their RDI efforts and expect further advancements and innovations in their respective segments.

Figure 30: Extent of RDI activities in the cluster over time. N=47. Source: Menon Economics



A comparison across counties reveals that Møre is one of the most RDI-intensive maritime counties in Norway. The figure below shows that Møre has seen an increase in the share of companies receiving support from 2019 to 2022. ¹⁹In 2022, Trøndelag is the only county surpassing Møre with a higher share of companies receiving support.

Figure 31: Share of maritime companies that have received support from at least one of the government initiatives, by county. Including counties with more than 400 maritime companies. Source: Innovation Norway, Enova, the Research Council of Norway, Menon Economics²⁰



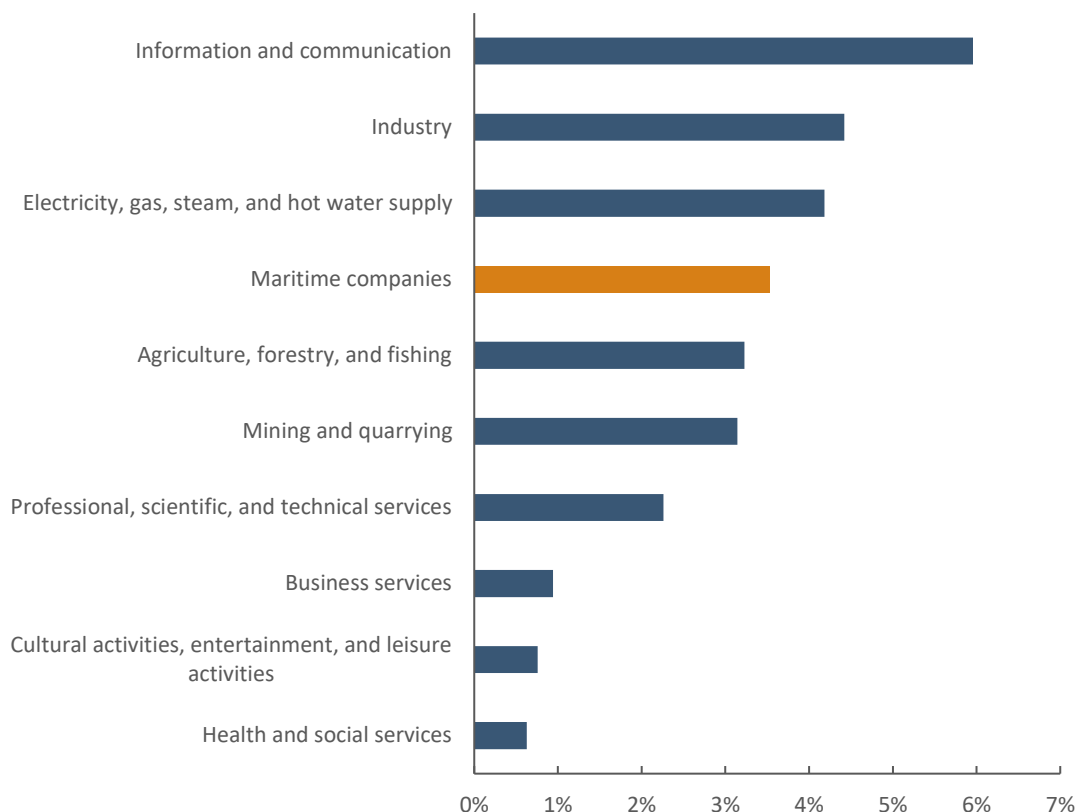
To benchmark the maritime industry against others, we compare sectors using NACE codes²¹. Included in the figure below are the ten sectors with the highest share of companies receiving support from at least one of the support schemes. The share of maritime companies receiving support is slightly lower than the share in the information and communication sector, the industrial sector, and the electricity, gas, steam, and hot water supply sector. However, it is worth noting that many of the maritime projects involve research and development, indicating that the industry is highly involved in innovation activities.

¹⁹ Because of the overall decline in Skattefunn projects in alle counties over time, we have excluded these projects from the figure below.

²⁰ This includes Skattefunn. There has been an overall decrease in the use of Skattefunn and if we exclude this from the figures, the share of companies receiving support in 2022 compared to 2019 increases. The total share however becomes significantly lower when excluding Skattefunn projects.

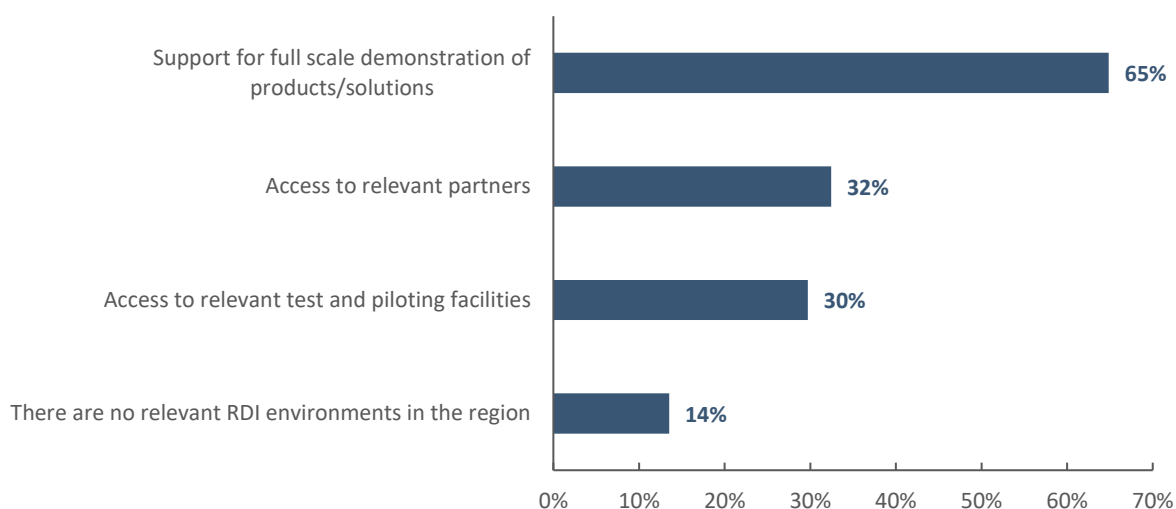
²¹ NACE is a classification system that categorizes businesses into various economic activities. It is an EU standard, and reflects the primary economic activity that a business engages in.

Figure 32: Share of companies that have received support from at least one of the government initiatives, maritime companies and «other companies» distributed by NACE codes. Year= 2022. Source: Menon Economics, Innovation Norway, Enova, the Research Council of Norway, Menon Economics.



Despite Møre companies' high participation in innovation activities, several factors can act as barriers to further innovation and development. The figure below shows the greatest challenges to innovation activities for the cluster's members. The lack of support for full scale demonstration of products and/or solutions stands out as the most important barrier among the companies, as nearly one third of the companies states this is a challenge.

Figure 33: The greatest barriers/challenges for innovation activities. N= 37. Source: Menon Economics



Some companies emphasize that financial support is mainly directed at basic research, with little support allocated to testing and piloting. This is also a challenge emphasized in Maritim21, stressing the need for support for larger demonstrations of projects and commercialization within key areas in the maritime industry. These are processes that are crucial in order to gain market trust and acceptance of new solutions²². 32 percent of the companies in the survey report that access to relevant partners is a barrier to their innovation activities. This suggests that these companies face challenges in finding and connecting with partners that possess the necessary expertise or resources to support their innovation efforts. Additionally, 30 percent of companies highlight access to relevant test and piloting facilities as another barrier to their innovation activities.

Patents and other IP

As companies strive to secure their foothold in ever evolving and competitive markets, the strategic protection of intellectual property becomes paramount, giving rise to patents as a powerful and insightful indicator for research, development, and innovation. The World Intellectual Property Organization defines patents as follows²³:

“A patent is an exclusive right to a product or a process that generally provides a new way of doing something or offers a new technical solution to a problem. To get a patent, technical information about the invention must be disclosed to the public in a patent application.”

Textbox: Short explanations of different applications

Patent protection provides exclusive rights for practical and innovative technical solutions to specific problems, prohibiting others from commercializing, distributing, importing, or selling the patented invention without the holder’s consent ²⁴ . Patents can be granted for new, inventive, and useful technical products, processes, or methods. They are classified according to the IPC ²⁵ , which organizes them into diverse categories ranging from human necessities to physics and electricity.
Design registration grants exclusive rights to the appearance and form of the product designed, preventing imitation in production, sales, and importation ²⁶ . It covers a wide range of classes, including all kinds of physical objects, icons, and interior designs. Registering your design is essential for protecting its value and gaining a competitive advantage in a market.

The rationale for exploring patents as an indicator for RDI stems from their intrinsic link to the innovative processes within organizations. Companies invest significant resources, both human and financial, into R&D endeavors to develop novel products, services, or processes. By securing patents, companies not only protect their investments but also disclose valuable information about their technological breakthroughs, allowing for a more transparent and collective progress in the scientific and industrial domains. In addition, intellectual property rights, which provide inventors with exclusive rights to their inventions for a limited period, will further

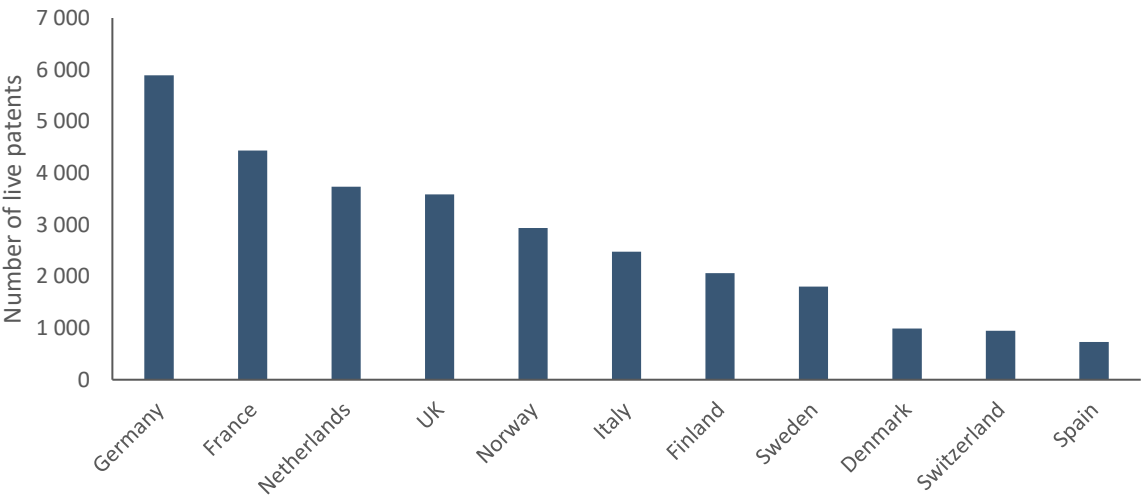
²² Maritim21, available [here](#)
²³ https://www.wipo.int/patents/en/faq_patents.html
²⁴ <https://www.patentstyret.no/en/services/patents/>
²⁵ International Patent Classification
²⁶ <https://www.patentstyret.no/en/services/designs/>

incentivize firms to invest in research and development activities to reap financial benefits from their new product. Patents also indicate progress made in a given field, as patents often reflect technological advancement.

However, it is also crucial to say that patents are only an indicator for research development and innovation activities. As mentioned above, obtaining and maintaining patents is a cost-bearing process. Moreover, some companies might choose not to patent certain inventions to maintain them as trade secrets to prevent competitors from accessing certain valuable information. Therefore, patents provide us with a picture that is an underestimation of the actual volume of research and development activity that takes place within the maritime cluster in the Møre region or the maritime industry as a whole.

Norway is one of the world’s most innovative countries when it comes to the maritime sector. As seen in the figure below, compared to its European counterparts, Norway owns the fifth highest number of live patents in Europe. Norway boasts a rich maritime heritage, with a long history of seafaring and shipbuilding expertise. This tradition has spurred innovation in various maritime technologies and practices, leading to the development of unique solutions and inventions deserving of patents and other intellectual property instruments.

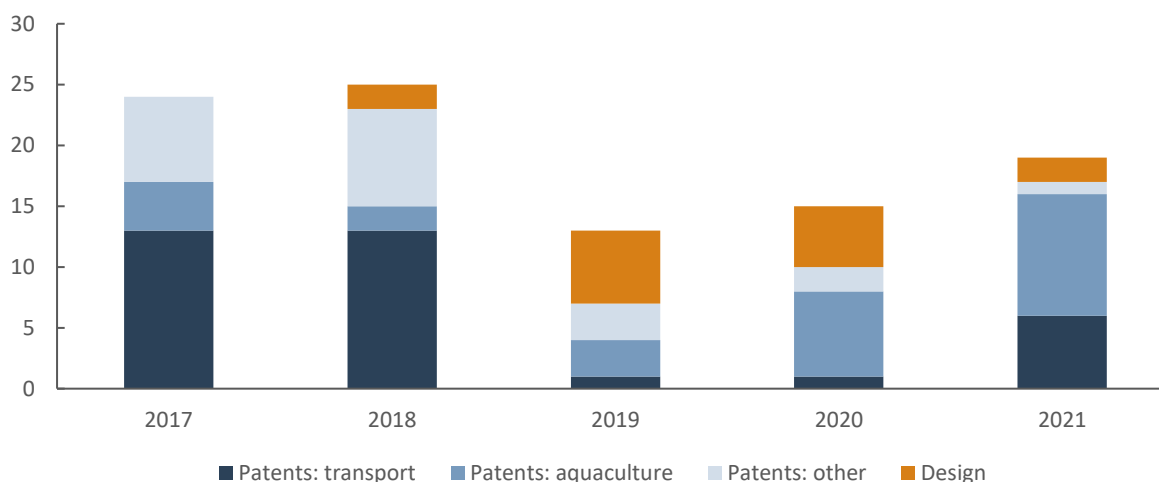
Figure 34: Number of maritime patents²⁷ owned by European countries. Source: Bureau van Dijk – Orbis Intellectual Property database



The legal protection of intellectual property (IP) covers several instruments, including patents, industrial designs, trademarks, and copyrights. As the Møre region is an important hub for maritime industry, actors here have also taken part in the innovation activities taking place in Norway. To highlight recent areas of innovation efforts within the Møre cluster, we present the distribution of IP applications categorized into patent segments and designs below. Within the Møre region, the primary classes of patents revolve around transportation and aquaculture. Transportation patents encompass inventions related to waterborne vessels or equipment used in maritime transportation, while aquaculture patents focus on fishing tackle or fishing equipment. As for design, the main applications within the region are typically associated with the legal protection of ship and boat designs, as well as related technologies. It is important to note that while not all applications are granted, we consider the act of applying as a demonstration of commitment and investment in innovative activities, recognizing that the granting process can be influenced by external factors.

²⁷ Maritime patents are defined as patents with the following IPC codes: B63B, B63C, B63G, B63H, B63J.

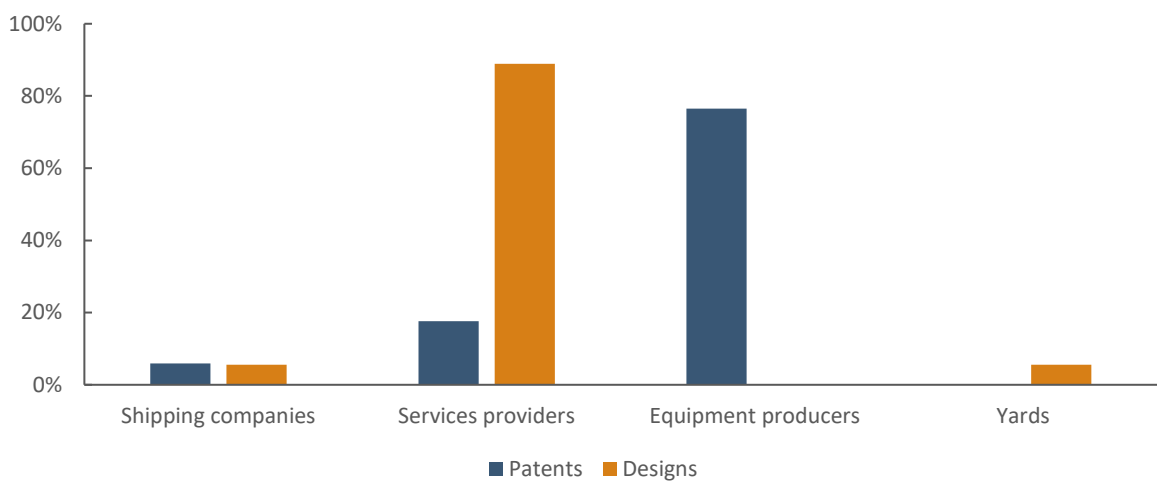
Figure 35: Number of applications for intellectual properties for maritime companies in the Møre region, 2017-2021²⁸.
Source: Norwegian Industrial Property Office



While the overall number of applications has increased from 2019 to 2021, there has been a shift in the relative importance of patent segments. Previously focused on transportation, the aquaculture segment has gained prominence in recent years, aligning with the growing significance of fishing and aquaculture within the industry. As evident from the figure below, equipment producers hold the largest share of companies applying for patents within the maritime cluster, while service providers have the biggest share of design, driven by ship design companies. The shift in patent segments and the equipment suppliers' transition to new markets underscores their ability to drive innovation and contribute to technological development. However, it is important to acknowledge that the overall number of IP applications was higher in 2017 and 2018. This pre-pandemic period marked a significant shift in focus from offshore oil and gas to more diversified markets within the maritime industry. The decline in innovative efforts could be attributed to several factors including weak financial solvency among the yards, reduced investment opportunities, and increased competition from other European yards. As for design, the overall number of applications has been reduced since 2019. As illustrated below, the service providers dominate this specific IP segment as ship design companies are included in this group.

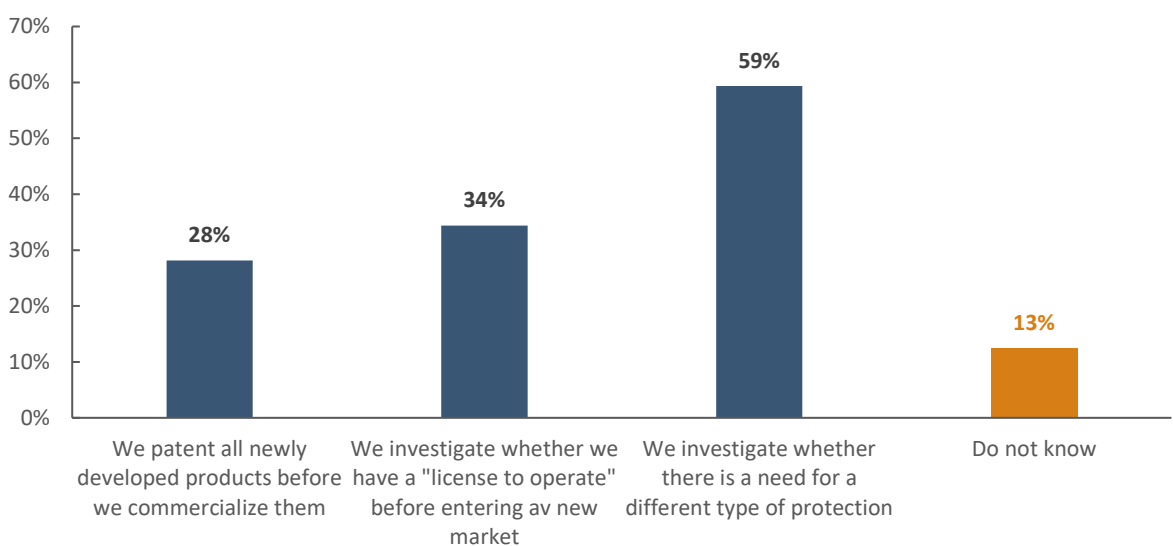
²⁸ Data presented is limited to 2021 since we rely on publicly available patent data, with applications having a minimum 18-month delay before becoming public.

Figure 36: Intellectual property split by the four groups in the region. Aggregated numbers, 2017-2022. Source: Norwegian Industrial Property Office



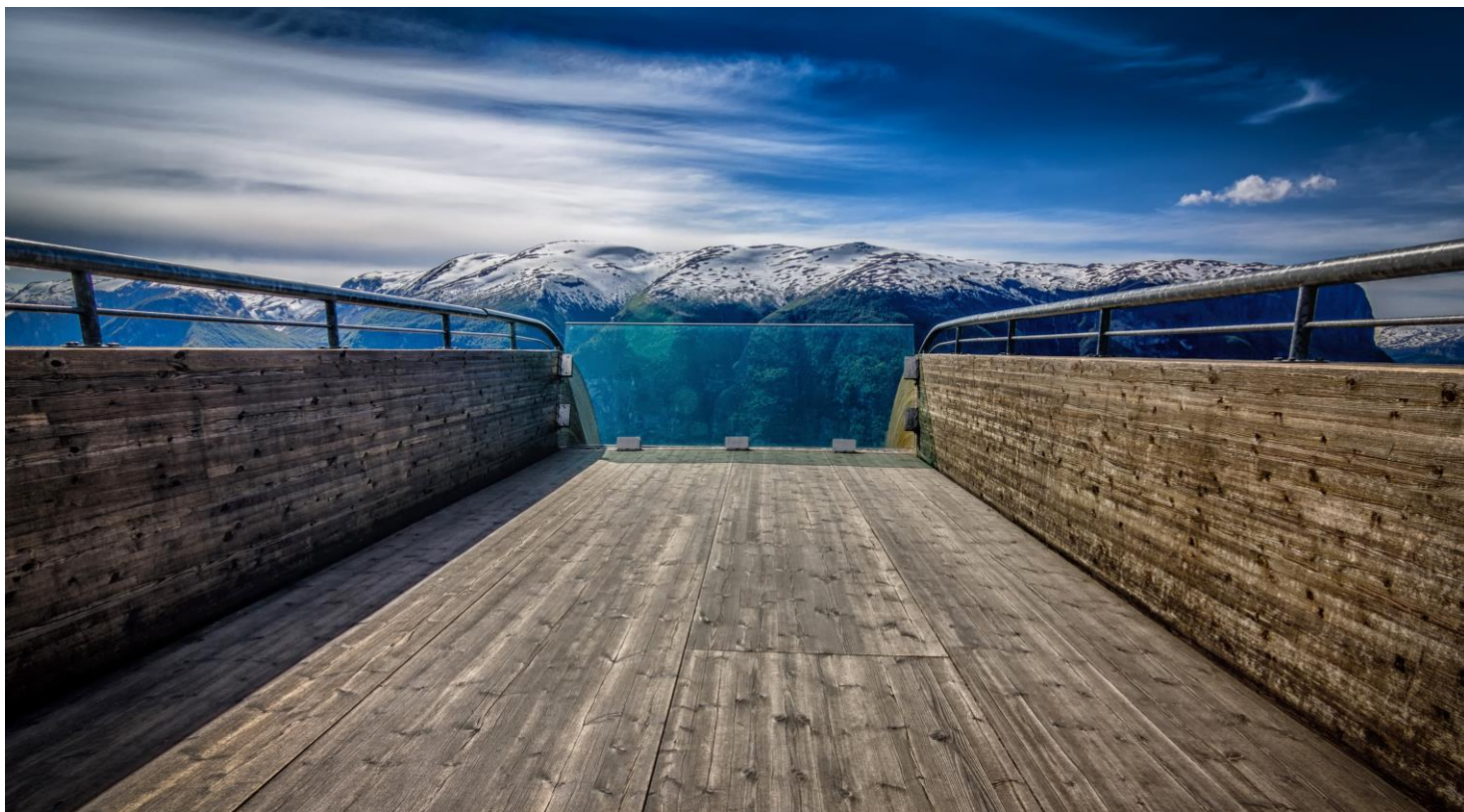
The change in both patent and design applications highlights the complex dynamics at play, with an interconnected value chain where both market transitions and external factors have influenced innovation trends in the region. In the survey we have conducted with Blue Maritime Cluster members we found that 65 percent of the responding companies had a form of technology that was protected by intellectual property rights. Later we asked these respondents how the intellectual property processes are organized among the members that reported having patented technologies or other intellectual property assets. The results in the figure below shed light on the different approaches employed by these companies. Note that the respondents had the option to select multiple answers, so the total percentages may not add up to 100 percent.

Figure 37: How intellectual property processes are organized among the cluster members. N=32. Source: Menon Economics.



28 percent of companies report that they patent all newly developed products before commercializing them. This suggests that the companies recognize the importance of securing patent protection to safeguard their innovations and gain a competitive edge in the market. Similarly, 34 percent emphasize the need for thorough evaluation and adherence to legal frameworks and regulation when expanding to new markets. The majority,

amounting to 59 percent, indicate that they actively explore whether there is a requirement for a different form of protection beyond patents, exhibiting a strategic approach where the companies consider various forms of intellectual property protection based on the specific nature of their innovation. These include design, copyrights and trademarks. The results demonstrate that Blue Maritime Cluster member companies place a significant emphasis on intellectual property and recognize the importance of protecting their technologies and assets before bringing them to market.



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