Norsk Industri

Norwegian Maritime equipment suppliers

2019

KEY PERFORMANCE INDICATORS AND FUTURE EXPECTATIONS

COAST GUARD VESSELS. PHOTO©LMG MARIN

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NORWEGIAN MARITIME EQUIPMENT SUPPLIERS, OCTOBER 2019
BY ANDERS HELSETH, ALEXANDER AAMO, MAREN BASSO AND ERIK W. JAKOBSEN,
MENON ECONOMICS

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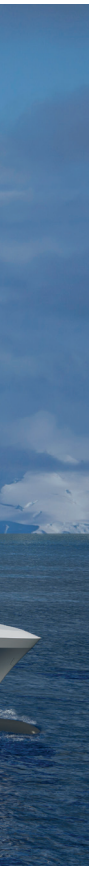

Preface

This is the sixth year we have asked Menon to do a survey of the maritime equipment industry, an exercise in collecting information and interviewing leaders to summarize the situation in our very diverse industry. It was only in 2014 we presented how large the industry is since such a survey had not been done earlier. Our industry employs around 18500 people, producing “everything” needed in a ship, from furniture and electronics to engines and cranes. An added dimension is that our companies are located mainly outside of metropolitan areas, in fact spread all over Norway.

Edged on by a favorable exchange rate for the Norwegian krone we see exports increasing to around 90%. Around 90% of our products are exported, 20% through our shipyards, the rest direct to customers abroad.

2019 is proving to be what the respondents in the 2018 report predicted, a year when the dramatic downturn ended. The revenues and order books are increasing, branching into other segments and removing the dependency on deliveries to the oil & gas sector. Cruise and ferries have taken a large share of orders, and we see a substantial increase in orders for so-called “green” technology. It is interesting to see green technology looked upon as an enabler, giving higher profitability and being a competitive advantage. Further, the offshore renewables sector is also viewed as having a promising future.

To try to summarize; our industry is sound, the number of employees and the profitability is on the way up, and we see that the leaders are optimistic as regards the future.

Again, we thank Menon Economics for their diligent work, and last, but not least we thank all the respondents for taking their time to participate also in interviews.

Oslo, October 20, 2019

Lars Gørvell-Dahll
Director, Maritime branch,
Federation of Norwegian Industries

Norsk Industri

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Summary

Production of ship equipment is one of Norway's few internationally competitive industries that does not rely on natural resources. In 2018, manufacturing and sales of ship equipment generated revenues of NOK 66 billion and employed 18,500 people. 70 per cent of the ship equipment produced in Norway is exported directly to Norwegian trading partners, with another 22 per cent indirectly exported through Norwegian yards or shipping companies operating abroad.

The industry is highly productive with each worker contributing more than NOK 1 million in value added to the Norwegian economy. Approximately 95 per cent of the total ship equipment suppliers are small- and medium-sized businesses, and they employ more than half of the workers in the industry. Besides being an SME, the typical Norwegian ship equipment supplier is located outside the metropolitan areas.

The Norwegian ship equipment suppliers have managed to steer through the challenging market conditions since the fall in the oil price in 2014. Many companies have successfully reoriented their businesses towards other market segments through strategic work over several years. 2018 was the first year where the increased revenue from new market segments outstripped the loss of revenue from declining deliveries towards offshore markets. Total revenue from sales of ship equipment increased by 9 per cent in 2018 with further growth expected in coming years.

Deliveries towards fisheries, aquaculture, cruise and ferries have more than doubled between 2017 and 2019, now accounting for approximately the same income as offshore and shipping markets. Further, the order books show that this reorientation is expected to continue. Markets other than offshore and shipping now constitute a larger share of order book value than the traditional markets.

Green technology is becoming an important business area for companies in the maritime equipment sector. According to the survey conducted for this report, around ten per cent of income comes from "green" equipment, defined as equipment which contributes to reduced environmental and climate footprints. Most companies expect that the importance of environmentally friendly technology solutions will increase significantly in coming years.

Moreover, companies not only expect green technology to be a driver of top-line revenue growth, they also expect that **stricter environmental regulations will have a positive impact on profitability**. Stricter climate regulations will increase demand for green technology where many Norwegian manufacturers believe to be leading the development.

ECONOMIC CONTRIBUTION FROM PRODUCTION OF SHIP EQUIPMENT IN 2018

18,500 jobs

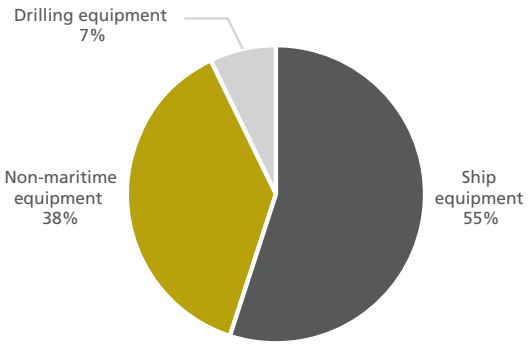
NOK 1,050k value added per employee

Total value added of NOK 19.3 billion

Focus on production and sales of ship equipment

The numbers presented in this report will cover only the maritime part of operations, excluding drilling equipment. The term used to encapsulate this in the report is "ship equipment". It is clearly stated where numbers presented or discussed deviate from this narrow definition of activities. On average, ship equipment represents 55 per cent of revenues for the companies included[1].

Figure 1 – Distribution of revenues for ship equipment producers separated into ship equipment, drilling equipment and non-maritime equipment, 2018. *Source: Menon Economics*



Ship equipment is further broken down into five sub-categories:

- **Mechanical equipment** refers to the production of equipment for carrying out mechanical operations such as lifting or propelling ships forward. The category is broad and includes suppliers of equipment such as cranes, winches, propellers, and engines.
- **Electrical and electronic equipment** refers to the production of equipment focusing on electrical and electronic components, including specialist hardware, software, electrical propulsion systems, bridge equipment or DP systems[2].
- The group dealing with **design** typically includes ship design companies such as Møre Maritime. The group also includes companies with a somewhat broader focus of which LMG Marin is an example. They offer design packages for both ships and rigs.
- **Other operating equipment** involves manufacturers of equipment necessary for everyday ship operations, including suppliers of items such as marine paint, lubricants, cables, chains, and lifeboats.
- **Trade** consists of companies that buy and sell goods for operating and maintaining ships, or act as dealers for equipment to other players such as shipyards in Norway and abroad.

[1] See "Delimiting the maritime industry" in the appendix for delimitation of the companies included.
[2] Dynamic positioning (abbreviated "DP") systems are systems for keeping ships or other vessels such as rigs or FPSOs in the same position above the seabed without the use of anchors, utilizing propellers and thrusters instead.

THE FIVE CATEGORIES OF SHIP EQUIPMENT AND EXAMPLES OF PRODUCERS IN EACH GROUP

MECHANICAL EQUIPMENT

Cranes | Winches | Propellers | Engines | etc

ELECTRICAL AND ELECTRONIC EQUIPMENT

DP | Software | Specialised hardware | Bridge equipment | Sensors | etc

DESIGN

Ship design

OTHER OPERATING EQUIPMENT

Paint | Lubricant | Cables | Chains | Life-boats | etc

TRADE

Agents | Wholesalers and distributors

Status and short-term outlook

Ship equipment suppliers constitute a key part of one of Norway's largest industries, the maritime industry. In 2019, the industry is estimated to contribute NOK 151 billion to the gross national product of the Norwegian economy and employs almost 90,000 people.

Despite being home to less than one-thousandth of the world's population, Norway is a major power in the international maritime industry. Norwegian-controlled shipping companies own around six per cent of the world's fleet in terms of value, and Norwegian companies are world-leading in many fields such as ship financing, certification and manufacturing of ship equipment. The companies are responsible for a constant flow of innovations in ship design, propellers, equipment, and services. With a heavy focus on developing more environmentally friendly equipment for the future, their international importance is expected to grow going forward.

PRODUCTION OF SHIP EQUIPMENT EMPLOYS 18,500 HIGHLY PRODUCTIVE WORKERS

Manufacturing and sales of ship equipment generated revenues of NOK 66 billion and employed 18,500 people in 2018. The industry is highly productive, with each worker contributing more than NOK 1 million in value added to the national economy. In comparison, workers in manufacturing of other mechanical and electronic products contribute on average NOK 830,000 in value added. [3]The companies in the maritime equipment sector are present in most areas of Norway, as is illustrated in Figure 2.

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[3] Statistics Norway, Menon Economics

Figure 2 – Economic contribution from the production of ship equipment and geographical presence of firms[4], 2018. *Source: Menon Economics*

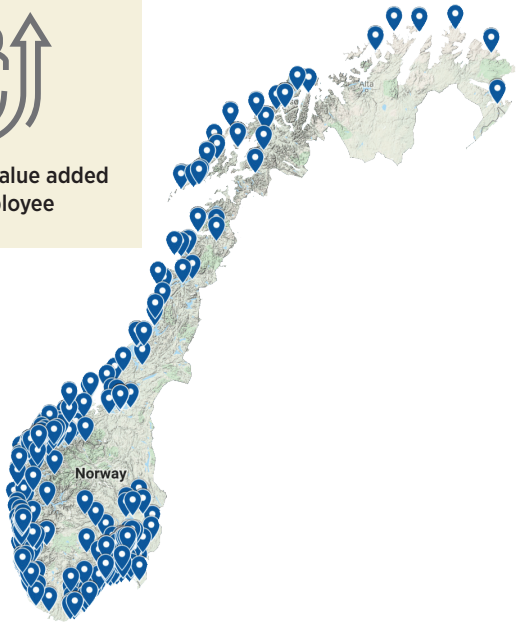
ECONOMIC CONTRIBUTION FROM PRODUCTION OF SHIP EQUIPMENT IN 2018

18,500 jobs

NOK 1,050k value added per employee

Total value added of NOK 19.3 billion

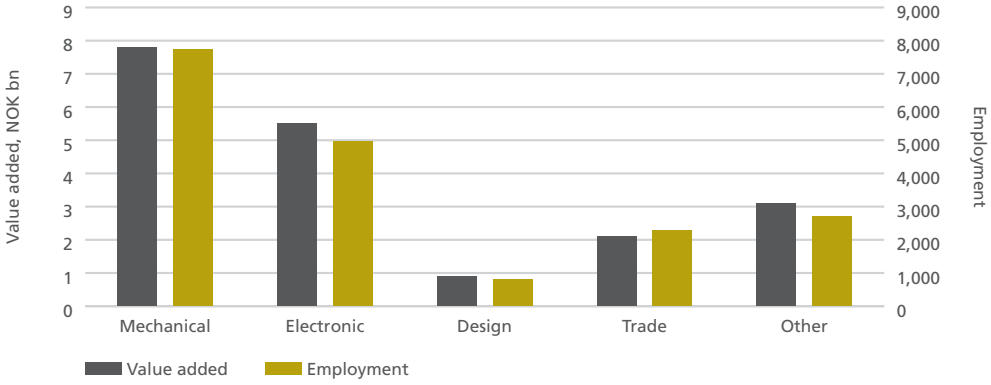
GEOGRAPHICAL PRESENCE OF FIRMS



The ship equipment supplier segment consists of manufacturers, designers, and traders of ship equipment. The manufacturers produce a wide array of equipment. Of this, mechanical equipment, such as cranes and propellers, constitute about half of the value added among the manufacturers. Electrical and electronic equipment make up a third of value added for the equipment produced in Norway, while the remaining portion of manufacturing is spread across producers of other operating equipment like marine coatings, cables and life-saving gear. In addition, we find that specialised design companies, in-house design and traders contribute about NOK 3 billion in value added and employ more than 3,000 people.

[4] Only companies with a valid Google Maps address in the Brønnøysund Register are included

Figure 3 – Value added and employment by types of ship equipment, 2018. *Source: Menon Economics*



THE TYPICAL SHIP EQUIPMENT SUPPLIER IS A SMALL OR MEDIUM-SIZED COMPANY LOCATED OUTSIDE NORWAY'S METROPOLITAN AREAS

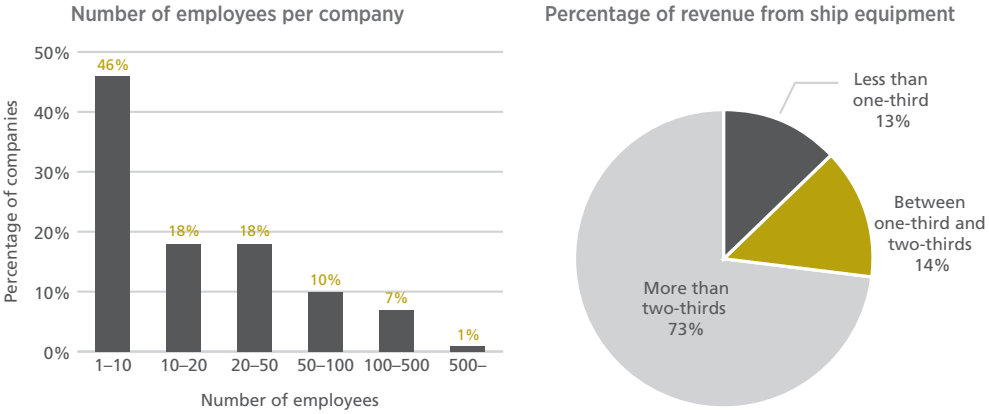
Many a little makes a mickle. The old saying holds true for the Norwegian equipment suppliers. While the largest companies typically steal the news headlines, much of the overall activity in the sector is derived from the numerous smaller companies spread across Norway. In 2018, small and medium-sized companies[5] employed more than half of the people working within the production of ship equipment.

The typical ship equipment supplier employs fewer than ten people, as illustrated in Figure 4. Almost half of the companies belong in this group, while more than 80 per cent of the companies employ less than 50 people.

As seen in Figure 1, the revenues for maritime equipment suppliers are separated into ship equipment, drilling equipment and non-maritime equipment. Roughly 55 per cent of the total revenue for the ship equipment suppliers is categorized as ship equipment. However, this is not the case for the typical ship equipment company, as a few large suppliers skew the distribution towards non-maritime equipment. As seen in Figure 4, slightly less than 75 per cent of the maritime equipment producers earn more than two-thirds of their revenue from sales of ship equipment.

[5] European Union definition of small or medium-sized businesses

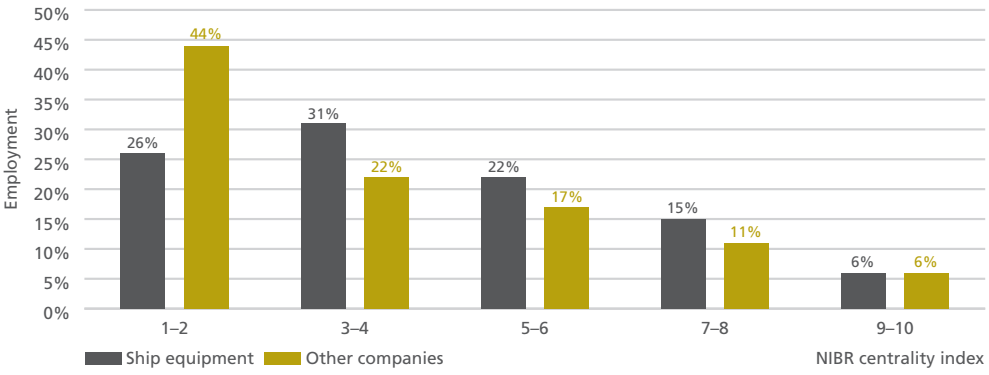
Figure 4 – Percentage of companies employing a given number of workers, and percentage of revenue derived from ship equipment. *Source: Menon Economics*



Besides being an important contributor to the small business segment in Norway, production of ship equipment is vital for employment in the less central areas of Norway. This is evident when looking at the geographical distribution of employees in the industry compared to other business sectors in Norway.

Statistics Norway (SSB) rank municipalities on a centrality index ranging from 1 to 10, where 1 is the most central and 10 is the least central. About one-quarter of employment in the ship equipment industry is located in the most central areas of Norway. This is significantly lower than the average for Norwegian businesses, where 44 per cent of jobs are found in these areas. Moreover, equipment suppliers have a larger share of its employment located in areas categorised in the mid-range of the centrality index. This is illustrated by the fact that more than two-thirds of the sector's employees work in areas categorised between 3 and 8 on the centrality index, compared to 50 per cent among the general Norwegian workforce.

Figure 5 – Percentage of employment by the NIBR centrality index for ship equipment suppliers compared to other Norwegian business sectors. *Source: Menon Economics*

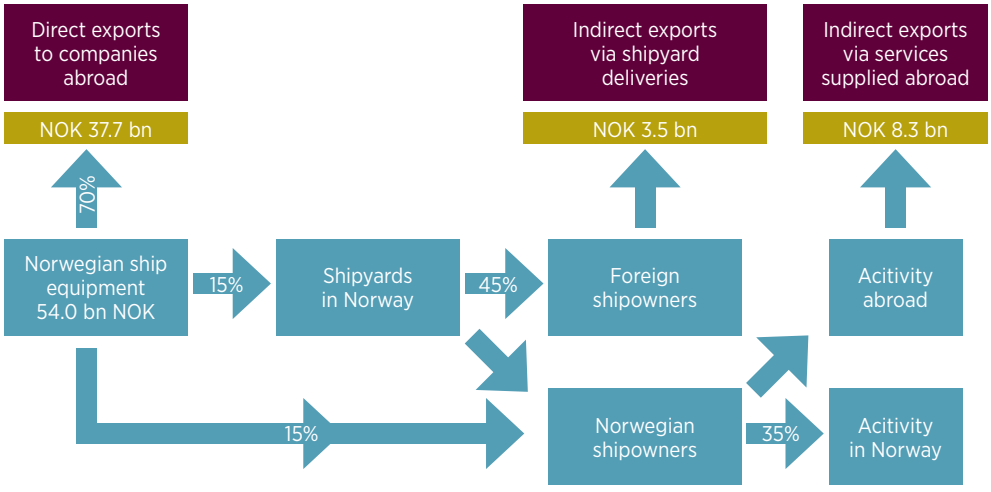


70 PER CENT OF SHIP EQUIPMENT IS EXPORTED DIRECTLY – ANOTHER 22 PER CENT THROUGH INDIRECT EXPORTS

The market for ship equipment is international. Seventy per cent of the equipment (roughly NOK 38 billion)[6] is sold directly to foreign yards, shipowners or other maritime companies abroad. In addition, a large share of equipment sold to Norwegian yards and shipowners is used as components in other exported products. This can either be through foreign orders with Norwegian yards or as equipment for Norwegian shipping companies supplying services abroad. The process is illustrated in Figure 6 below.

Norwegian manufacturers are facing fierce competition from other countries with lower labour costs. Nevertheless, the sector has managed to maintain a high export intensity over several years, even increasing somewhat over the last year, though mainly due to favourable exchange rates. The continued demand for Norwegian equipment abroad is an indication of the domestic manufacturers' ability to maintain competitiveness in the world market.

Figure 6 – The value chains of the ship equipment industry – with direct and indirect exports[7], 2018.
Source: Menon Economics



[6] Traders of ship equipment are left out to avoid potential double counting.
[7] The data is based on the survey conducted in conjunction with this report. The split between Norwegian and foreign shipowners is based on an earlier survey conducted with yards in the Møre-region. There is some uncertainty around this estimate, as the Møre yards might not be representative of all yards in Norway.

REVENUE AND EMPLOYMENT ARE INCREASING AFTER A FEW CHALLENGING YEARS

The Norwegian ship equipment suppliers have faced tough market conditions since the collapse of the oil and gas markets in 2014. Due to the interconnectedness of maritime and energy markets, the years after the slump saw a sharp decline in revenues. From the top in 2014, total annual revenue among the ship equipment suppliers fell by almost 30 per cent through 2017.

Even though investments in the oil and gas markets have increased, the oversupply of ships in the market has kept newbuilds down. As a result, the Norwegian ship equipment suppliers have turned their attention towards other market segments. In 2018, the increased revenue from these new market segments finally outstripped the loss of revenue from still-suffering deliveries in the offshore markets. Total revenue from sales of ship equipment increased by 9 per cent in 2018, with further growth expected in coming years. Based on the ship equipment suppliers' own expectations, we estimate that revenue will increase by approximately 10 per cent in 2019 and a further 6 per cent in 2020.

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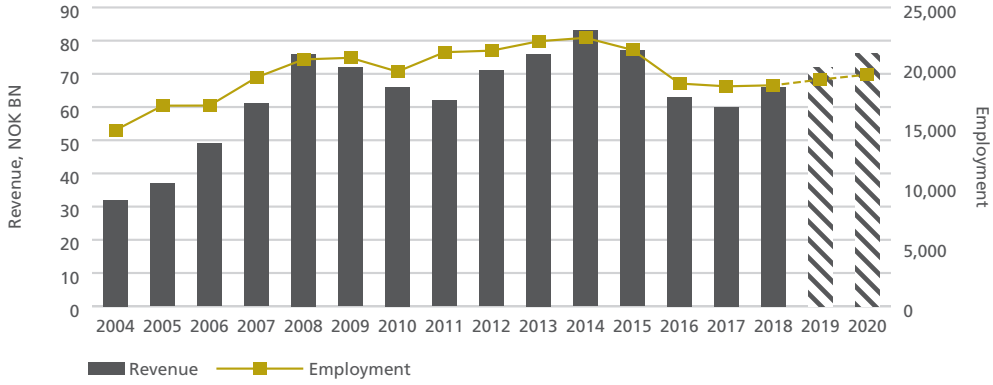
Figure 7 – Development in revenue and employment from 2004-2020. Forecasted values for 2019 and 2020.
Source: Menon Economics

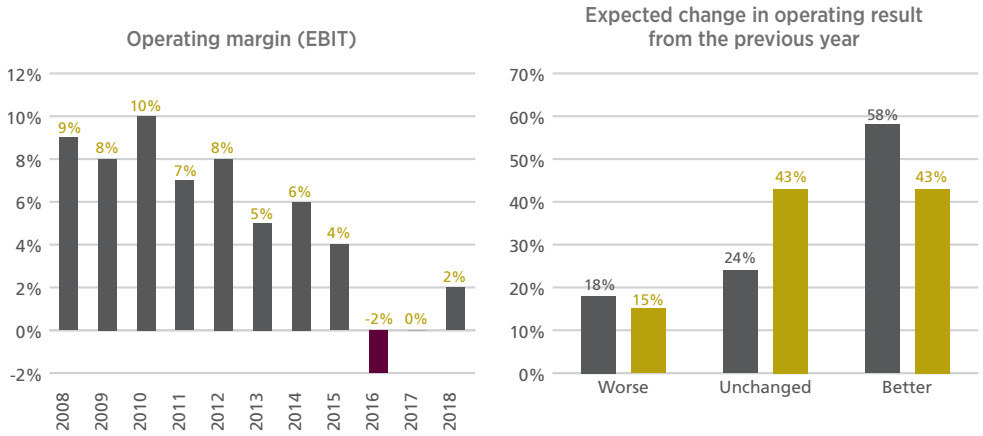


While revenue is growing, employment growth lags slightly behind. Employment increased by less than 1 per cent in 2018 and is expected to grow by 3 per cent in 2019 and 2 per cent in 2020, which is somewhat below the growth rate expected in revenue. The explanation behind the discrepancy in revenue and employment growth is multifaceted.

Firstly, profitability has been and still is, historically low among the equipment suppliers. After losing money in 2016 and 2017, the ship equipment suppliers have once again turned profitable in 2018, although at an operating margin of only 2 per cent. Increased price pressure due to the negative demand shift in the wake of 2014 is a large part of the explanation for the lower margins.

However, companies also seem to have kept more employees than strictly necessary during the downturn. In other words, revenue fell by more than employment. This may very well have been justified from an economic point of view, as hiring new people is associated with other costs than just the wage costs. Considering this, companies expecting higher activity have held onto employees while waiting for revenues to increase back to previous levels. Accordingly, while we are still in the early stages of the upturn, revenue is now rising more than employment. When, and if, activity continues to increase and productivity reaches its previous levels, we should expect jobs to grow in tandem with revenues.

Figure 8 – Operating margin by year (2008-2018) and expected development in operating margins from the previous year in 2019 and 2020. *Source: Menon Economics*



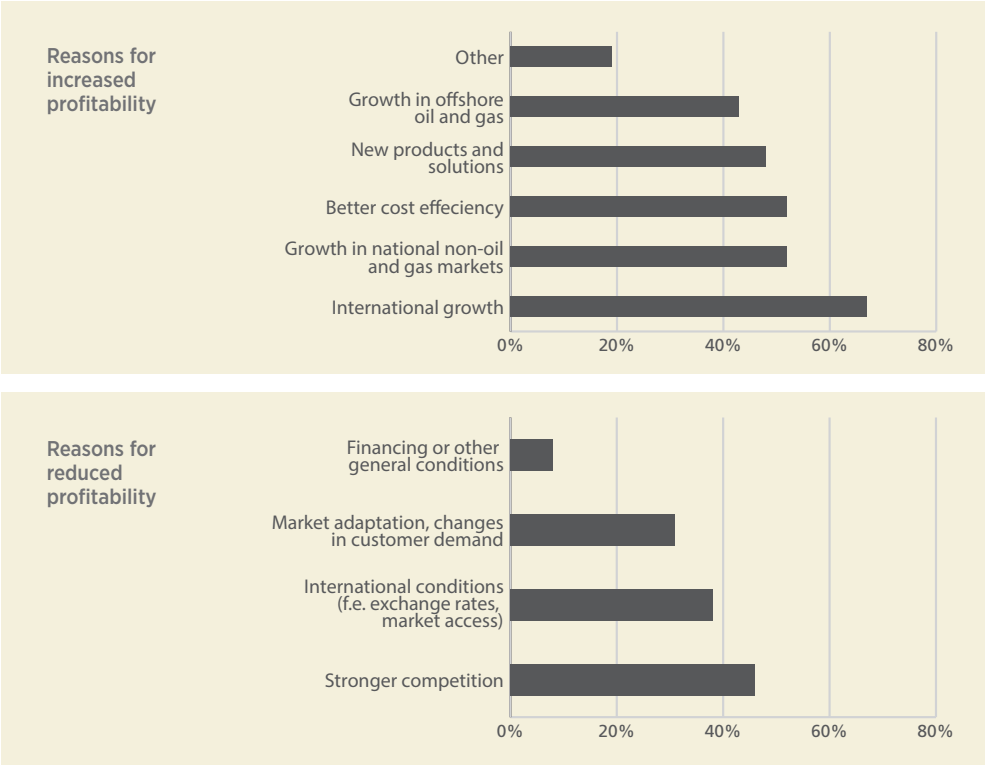
Secondly, the Norwegian equipment suppliers have experienced favourable foreign exchange developments over the last years. The continued weakening of the Norwegian krone has contributed to increased revenue among the highly export-oriented equipment suppliers, as most orders are completed in US dollars. Thus, the volume of sales has risen less than the value of sales, which consequently leads to a smaller demand for new employment. Nevertheless, it is important to stress that favourable exchange rates impact costs as well. Costs of both foreign goods and services have increased in tandem with the weakening of the Norwegian krone.

PROFITABILITY IS HISTORICALLY LOW – BUT COMPANIES EXPECT BETTER OPERATING RESULTS IN 2019 AND 2020

Industries compete for capital, and capital will flow to the most profitable investment opportunities. The low operating margins seen over the previous years, as a result, cannot continue indefinitely as capital will flow from the ship equipment suppliers towards other industries.

Luckily, companies are generally expecting better operating results in 2019 and 2020. 58% of the respondents expect increased profits in 2019. Still, approximately one-quarter of the companies expect profits to be largely unchanged while almost 1 in 5 companies expect reduced operating results in 2019. Based on our survey, profitability will rise further in 2020, but at a slower rate than in 2019. 43 per cent expect profits to be larger than in 2019, while the same amount expects profits to be unchanged, albeit from a higher base.

Figure 9 – Reported reasons for expected changes in profitability among the respondents. *Source: Menon Economics*



Companies expect increased profits for a variety of reasons. International growth is the most cited reason, as almost 70 per cent of the companies report this will contribute to increased profitability.

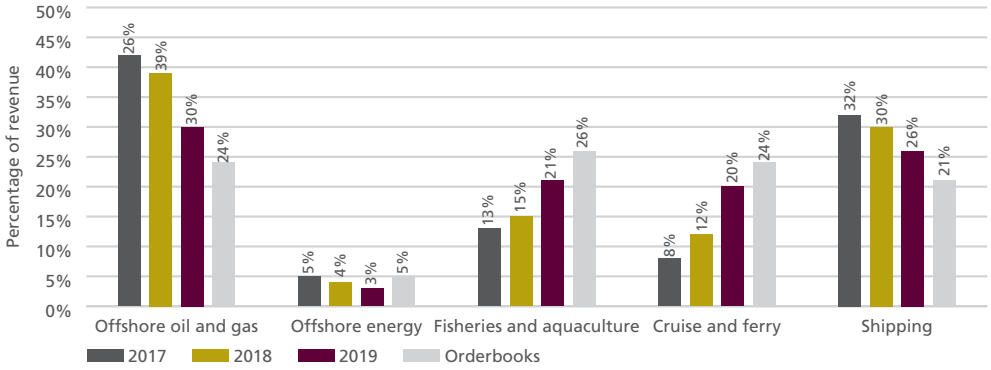
Market developments are not the only driving force for healthier profit margins. Interestingly, three-quarters of the companies expect increased cost-efficiency or new products and solutions to be part of the reason for better profitability. Of those expecting reduced profits, stronger competition is most often cited, while changes in customer demands and international conditions play a role as well.

"NEW" MARKET SEGMENTS SET TO SURPASS THE TRADITIONAL MARKETS IN IMPORTANCE

The market segmentation of the companies' revenues tells a story of successful reorientation towards new markets. Naturally, previous revenue from the oil and gas market could not be replaced overnight. While facing lower revenues and profitability, the equipment suppliers have worked hard to adjust their business to serve other markets.

From 2017 to 2019, we see the results from these efforts in the aggregated numbers. Deliveries towards the cruise and ferry markets have tripled in the last two years, while deliveries towards fisheries and aquaculture have doubled in the same period. With falling revenues in offshore markets and relatively stable demand for deliveries towards traditional shipping, "new" markets have increased their importance significantly. Deliveries towards fisheries and aquaculture, combined with the cruise and ferry segment now constitute more than 40 per cent of revenue, compared to 21 per cent just two years ago.

Figure 10 – Sub-markets as a percentage of total revenue (2017-2019) and the various sub-markets' share of current order book value. *Source: Menon Economics*



The order books indicate that the trend seen over the past years will continue. The share of the order book related to fisheries and aquaculture is five percentage points higher than its expected revenue share in 2019, and the corresponding number for deliveries towards cruises and ferries is four percentage points. Deliveries towards these market segments now make up half of the order book value. The offshore renewable energy market similarly looks to be gaining importance, with a 5 per cent share of orderbook value compared to 3 per cent of revenue in 2019.

The big Norwegian yards now get close to half of their revenue from cruise vessels. While this market has grown in importance for the ship equipment suppliers as well, the relative importance of the market segment is much smaller than for the yards. The order books are, as illustrated in Figure 9, diversified across many market segments, making the industry more robust against fluctuations in one specific market segment.

COLOR HYBRID. PHOTO©COLOR LINE

The outlook

Improved technology in the maritime sector is poised to be a vital ingredient if we are to reach the aims of the Paris Agreement. Norwegian authorities and NGOs similarly affect the demand from shipping companies through regulations and well-defined objectives for the reduction of emissions. If capitalised on, the know-how gained in the production of environmentally friendly equipment could prove an early-mover advantage for Norwegian maritime equipment suppliers.

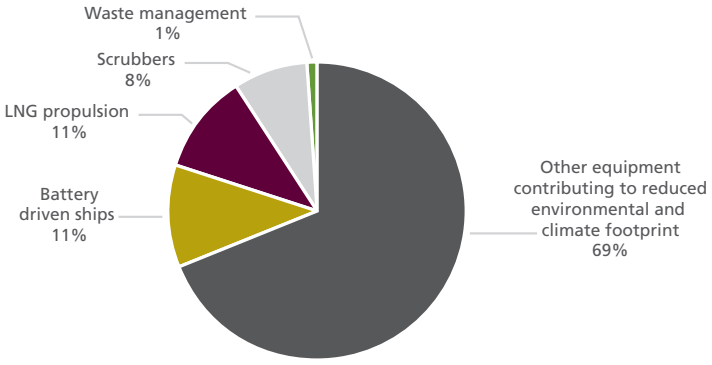
ABOUT TEN PER CENT OF THE INCOME TODAY COMES FROM GREEN TECHNOLOGY

In this year's survey, we asked the respondents how much of their revenue comes from equipment contributing to reduced environmental and climate footprints. The answers indicate that about 10 per cent of this year's revenue comes from this type of equipment. In 2019, total revenue from environmentally friendly equipment is thus estimated to be about NOK 7 billion.

Battery driven or battery-assisted (hybrid) ships, scrubbers and LNG propulsion are often mentioned when discussing how the maritime sector can reduce its emissions. 30 per cent of the "green" equipment is reported to be from within these categories. However, other types of equipment still make up more than two-thirds of equipment the companies characterise as environmentally friendly.

What could be found within the "Other-category" is best illustrated with an example. When the Norwegian shipping company Awilco saw the need for fleet investments, they put an extra emphasis on reducing both air and ocean emissions. Awilco managed to reduce fuel consumption by 30 per cent, equating 25 tonnes CO2 each day per ship. Included in the adjustments made for reducing emissions, we find essential contributions from the equipment suppliers. The new ships, among other things, needed lighter pipes, altered propeller size and modifications in the machinery.

Figure 11 – Distribution of equipment with a self-reported positive climate and environmental footprint by type. *Source: Menon Economics*



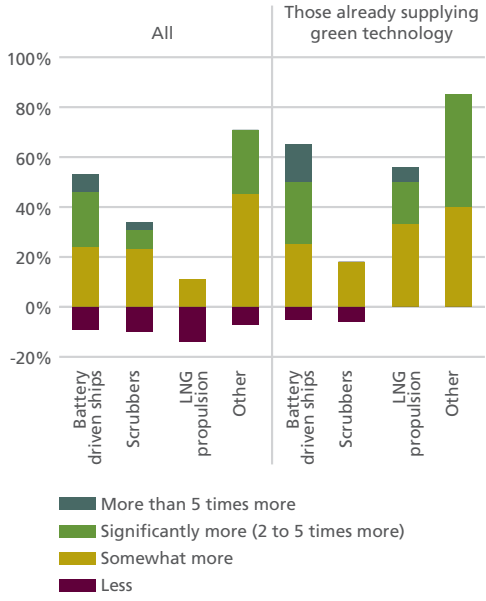
THE FJORDS. PHOTO©SVERRE HJØRNEVIK

GOING FORWARD, SALES OF GREEN TECHNOLOGY WILL INCREASE AS A SHARE OF REVENUE

The equipment suppliers consider green technology a huge business opportunity in the future. More than 95 per cent of companies expect that sales of equipment contributing to reduced climate and environmental footprints will increase as a share of total revenue in the medium term.

When asked what part of their green portfolio that will have the highest growth in coming years, respondents mention battery-driven/ hybrid ships and "other types of green technology". The companies that are already supplying green technology are slightly more bullish about green technology in the future than their peers. Consequently, they expect higher growth in each of the segments shown in Figure 11 than companies with no current production of green technology.

Figure 12 – Expectations for the share of revenue to come from various green technologies in three to five years, compared to today. *Source: Menon Economics*



PHOTO©ULSTEIN

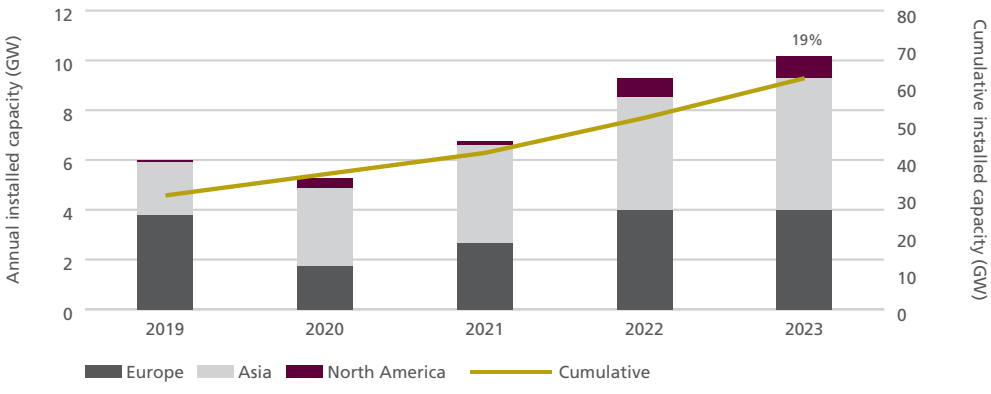
Companies do not only expect green technology to increase in importance in the future, but many expect stricter environmental regulations to be positive for profitability as well. Half of the respondents believe profitability will increase with more stringent regulations, while 33 per cent disagree. The optimism seen by many companies stems from expectations on how this will affect customer demand. Stricter climate regulations will necessarily increase demand for green technology, an area where many Norwegian manufacturers believe to be leading the development, and therefore are able to charge prices which will result in higher margins.

OFFSHORE WIND IS COMING TO THE NORWEGIAN CONTINENTAL SHELF

Investment in the offshore wind market is expected to increase in the next five years. Cumulative installed capacity is expected to grow by almost 19 per cent per year between 2019-2023, albeit from a low base compared to the oil and gas industry.

The industry is developing quickly. In 2002, the first utility-scale offshore wind farm with a capacity of 160 MW was connected to the grid in Denmark. Since then the average project has

Figure 13 – Forecasted global installed capacity in offshore wind 2019-2023. *Source: BVG Associates*



moved to sites further from shore, in deeper waters, with higher wind speeds and thus with ever-increasing generating capacities. The cost of offshore wind is falling, and in 2017 the first contract without any subsidies was awarded in Germany. If costs keep falling, the impressive growth in offshore wind could continue in coming years.

In 2019 Menon Economics[8] looked at the potential for value creation in the Norwegian floating offshore wind industry. The report concluded that in a high outcome scenario the value added from the floating offshore wind industry could reach NOK 117 billion and have employment effects of almost 130,000 work-year-equivalents in Norway over a period of 30 years. In this scenario, the Norwegian share of the global market is estimated to increase to 20 per cent. This illustrates the potential of the offshore wind segment.

In August of 2019, ENOVA granted NOK 2.3 billion in financial support to develop the floating offshore wind park Hywind Tampen. Hywind Tampen is expected to become the largest such wind park in the world. [9]The wind park will consist of 11 wind turbines producing a total of 384 GWh annually and will provide electricity to the oil fields Snorre and Gullfaks.

In September 2019, Equinor and its partners were awarded contracts to develop three large offshore wind projects in the North Sea. The combined project is the world's largest and will be able to deliver electricity to 4.5 million British households.[10]

These two projects, along with other potential projects - both floating and fixed - could provide significant opportunities for Norwegian ship equipment manufacturers. Exposure to large-scale projects will enable Norwegian maritime equipment manufacturers to build know-how and thus increase the chances of thriving in this global market.[11]

ACCESS TO COMPETENT WORKERS WILL BE ESSENTIAL FOR COMPANIES TO MAINTAIN THEIR INTERNATIONAL COMPETITIVENESS

Ship equipment suppliers operate in a global market and face competition from countries with lower labour costs. To be competitive, the companies must either charge higher prices (mainly through delivering goods and services of higher quality) or produce them in a less labour-intensive fashion to keep prices down.

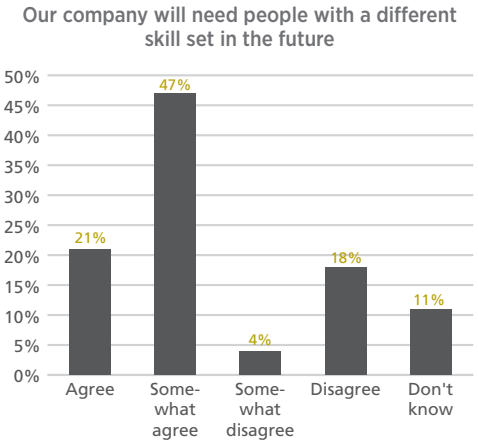
The large exports indicate that the Norwegian equipment suppliers are highly competitive on the global market. The ability to compete against countries with lower labour costs is made possible by two key factors; firstly, the production of the Norwegian manufacturers is more capital-intensive. Secondly, they employ innovative workers who are able to manage more advanced technology.

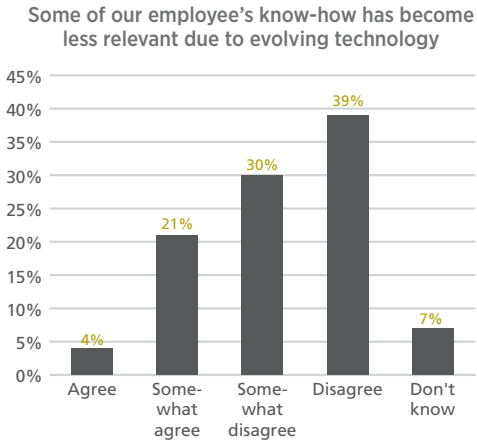
As Norwegian companies cannot rely on low labour costs in order to stay competitive, it's imperative that they continue to employ workers with a higher competence than their competitors. Technology is rapidly changing the ways businesses work at all levels. If these changes erode Norwegian suppliers' knowledge advantages, this could potentially challenge their competitive edge over countries with lower labour costs.

In this year's survey, we asked companies whether they in the future see the need for employees with a different skill set, and whether some of their employee's know-how has become less relevant due to evolving technology.

[8] Menon (2019), Verdiskapingspotensialet knyttet til utviklingen av en norskbasert industri innen flytende havvind
[9] http://presse.enova.no/pressreleases/enova-stoette-til-hywind-tampen-2909002
[10] https://www.equinor.com/no/news/2019-09-19-doggerbank.html
[11] https://www.enova.no/bedrift/energisystem/historier/derfor-stotter-vi-hywind-tampen/

Figure 14 – Respondents' indications on the state of skills among their employees. *Source: Menon Economics*

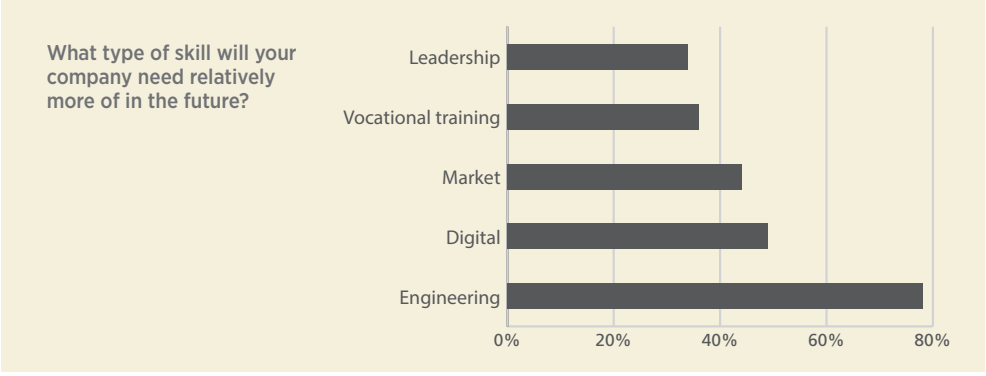




Approximately two-thirds of companies acknowledge the need for employees with a different skill set. Somewhat surprisingly, it is not the need for digital skills most companies will need relatively more of. Almost 80 per cent of the firms that agreed they need people with a different skill set point to engineering skills as a crucial competency which they expect to require more of. Similarly, 50 per cent say they will need more digital skills going forward. Most companies, however, expect to lack a varied set of competencies going forward, with the average respondent providing two or three different skills they see an increased need for in the future.

When it comes to the existing workforce, most firms believe their workers still have the necessary skills to produce quality equipment. However, a quarter of the companies agree or somewhat agree that some of their employee's know-how has become less relevant.

Figure 15 – Respondents' projection of future demand for various skills. *Source: Menon Economics*



DIGITALISATION

Digitalisation is one of the focus areas in the industry. In many respects, the process has already come a long way, and is starting to challenge the companies' business models. The challenge does not necessarily stem from developing new technology but rather applying the relevant technology quickly in areas that increase the companies' competitiveness.

The Norwegian equipment suppliers are recognised for their high level of skills and technical know-how and as such are well positioned to adapt and excel in new technologies. The high wage levels in Norway are likely to push the digitalisation of firms even further in their quest for high productivity.

The combination of new technology and increasing automation creates opportunities to process large amounts of information. Further, this has the potential to provide optimisation benefits relating to fuel consumption, route planning, logistic operations and to service and repairs. "Vastly improved maritime connectivity, the advance of cyber-physical systems and 'digital' twins will dominate the digital side of shipping in the coming decade, as vessels increasingly resemble floating computers" – DNV GL.

"VESSEL INSIGHT" – DIGITALISATION THROUGH QUALITY DATA

Access to quality data is one of the critical challenges for digitalisation in the maritime industry. Norwegian suppliers continue to cement their positions as world-leading in the development of new technologies. Kongsberg Maritime has more than 30 years of experience from delivering management information systems and as a system integrator in the maritime sector. After the acquisition of Rolls Royce Commercial Marine in 2019, more than 30,000 ships, approximately half of the world's fleet, have Kongsberg Maritime-equipment onboard their ships. Through their "Vessel Insight", Kongsberg Maritime attempt to give their customers a complete digital insight and overview of their vessels. This includes information contributing to decrease fuel consumption, increase energy efficiency and optimise route planning. This will provide their customers with a competitive edge in a fast-paced digital world[1].

In Vessel Insight, only data files with necessary information is downloaded to the sky-service Kognifai.
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Appendix

DATA REGISTRY AND SURVEY DATA

The report is based on a registry of all Norwegian entities that deliver accounting information to the national Brønnøysund Register Centre. Discrepancies in results from previous editions are related to changes in companies that are included or excluded. Minor changes in the numbers can occur due to updated financial information for historical data. Changes may also occur as some historical maritime shares have been updated based on new information. Official registries changed the way they counted an employee in 2015. As a result, employment numbers in 2014 and 2015 are not directly comparable.

The survey was sent out in September 2019 to about 400 respondents and received a total of 62 responses. In addition to responses gathered in this project, Menon has collected information from many companies in the GCE Blue Maritime Cluster through a similar survey in relation to another project. These survey responses are used for this project as well, bringing the total number of respondents to 89.

To assure that the survey was representative for the whole ship equipment industry, we focused on obtaining responses from all the largest companies, since these dominate overall activity in the industry. We were mostly successful in doing so. For the most important non-responders, in terms of impacting the combined numbers, information has been gathered from alternative sources.

The subdivision into the various categories of ship equipment is made by the companies' self-reported estimates (from the questionnaire), or, if this was not available, by industry codes and our knowledge of the companies.

Export data is mainly gathered through the survey but also combined with information from earlier studies by Menon.

DELIMITING THE MARITIME INDUSTRY

Menon developed the following definition of the maritime industry as part of the research project "A Knowledge-Based Maritime Industry" from 2011:

> ***– All businesses that own, operate, design, build, supply equipment or specialist services to all types of ships and other floating entities***

The report focuses on companies which satisfy the definition above and excludes producers of drilling equipment from the main set of companies in the sector[12]. The remaining companies are referred to as producers, manufacturers or suppliers of ship equipment.

[12] Statistics Norway (SSB) includes drilling equipment in their definition of maritime equipment.

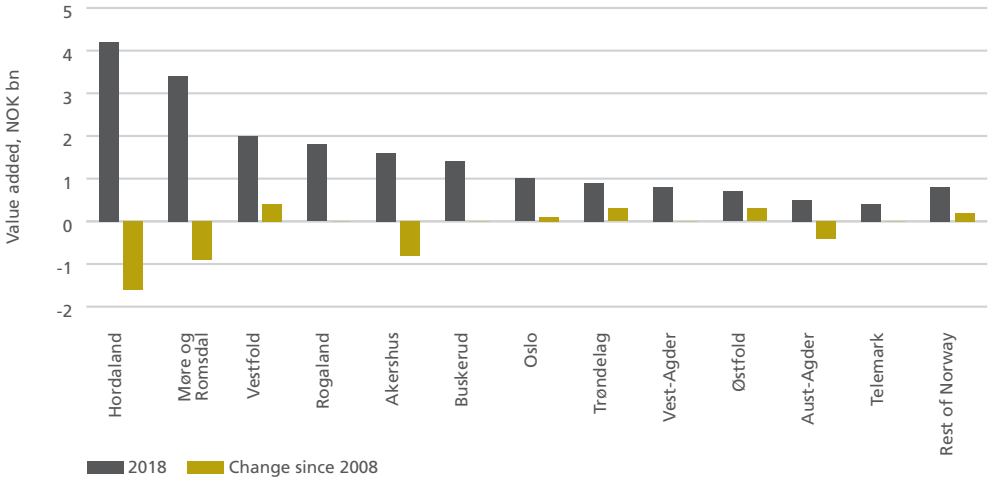
Geographical footprint

EMPLOYMENT AND VALUE ADDED BY COUNTY IN 2018

Figure 16 – Employment by county in 2018, rounded to the nearest 100. *Source: Menon Economics*

County	Employment 2018	County	Employment 2018
Møre Og Romsdal	4,100	Aust-Agder	600
Hordaland	3,600	Østfold	500
Vestfold	1,900	Telemark	400
Rogaland	1,500	Nordland	400
Akershus	1,400	Sogn Og Fjordane	200
Buskerud	1,300	Troms	100
Trøndelag	900	Finnmark	100
Oslo	800	Hedmark	100
Vest-Agder	700	Oppland	100

Figure 17 – Value added by county in 2018 and 10-year nominal change in value added. *Source: Menon Economics*



Historical results – Ship equipment

Figure 18 – Revenue and operating margins for ship equipment producers. 2004-2018.
Source: Menon Economics

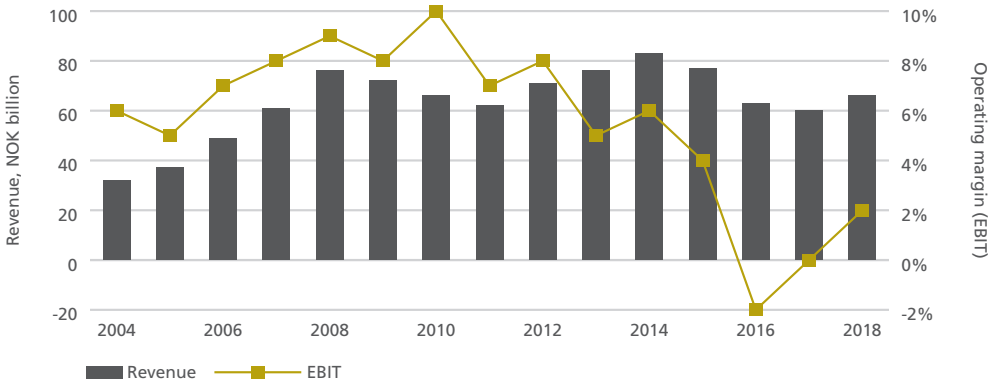
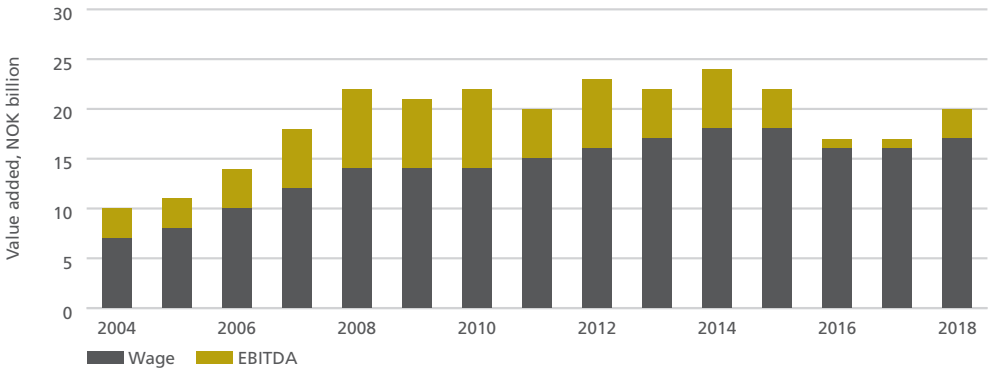


Figure 19 – Value added, divided into wage cost and EBITDA for ship equipment producers. 2004-2018.
Source: Menon Economics



Historical results by types of ship equipment

Table 1 –Key numbers by types of ship equipment in 2018. *Source: Menon Economics*

Subgroup	Revenue	Value added	Operating margin	Employment
Design	2.3	0.9	3%	800
Other	10	3.1	5%	2,700
Trade	11.6	2.1	1%	2,300
Electronic	15.6	5.5	2%	5,000
Mechanical	26.2	7.8	2%	7,700
Ship equipment	**65.6**	**19.3**	**2%**	**18,500**

MECHANICAL EQUIPMENT

Figure 20 – Revenue and operating margins for producers of mechanical equipment. 2004-2018. *Source: Menon Economics*

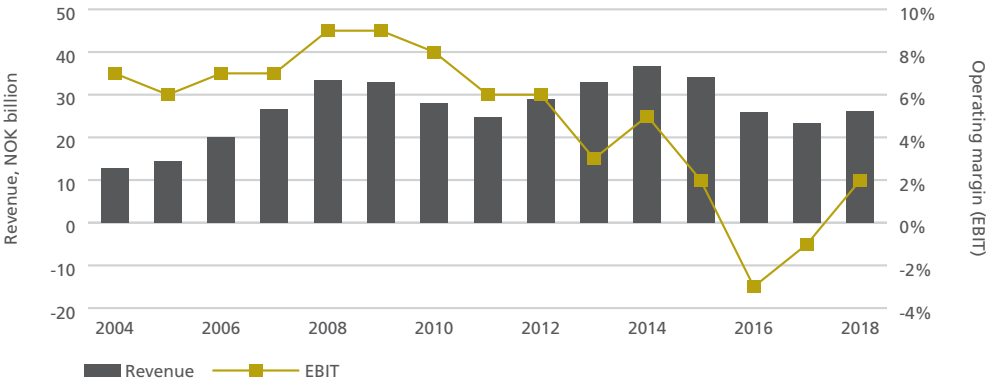
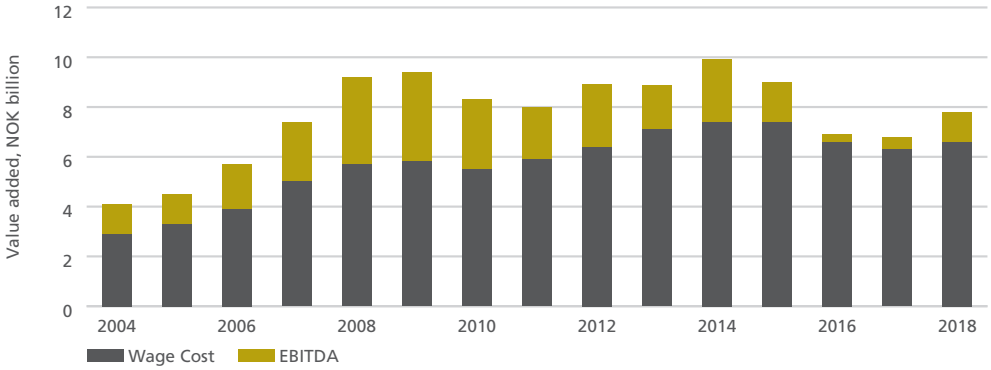


Figure 21 – Value added, divided into wage cost and EBITDA for producers of mechanical equipment, 2004-2018. *Source: Menon Economics*



ELECTRICAL AND ELECTRONIC EQUIPMENT

Figure 22 – Revenue and operating margins for producers of electrical and electronic equipment. 2004-2018. *Source: Menon Economics*

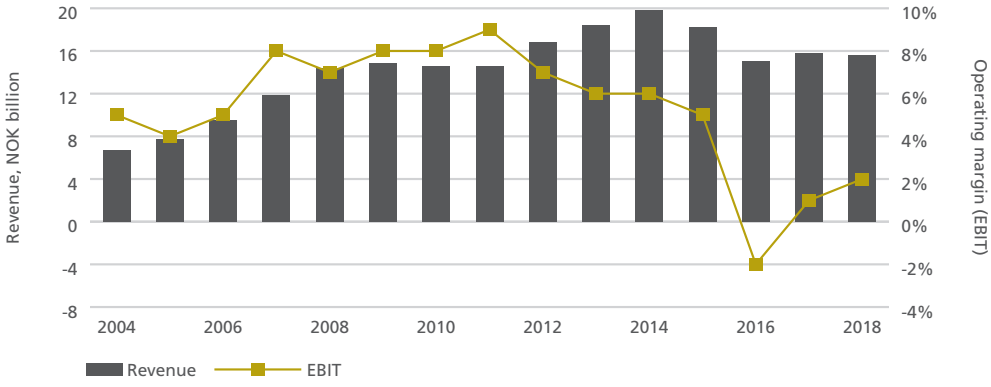
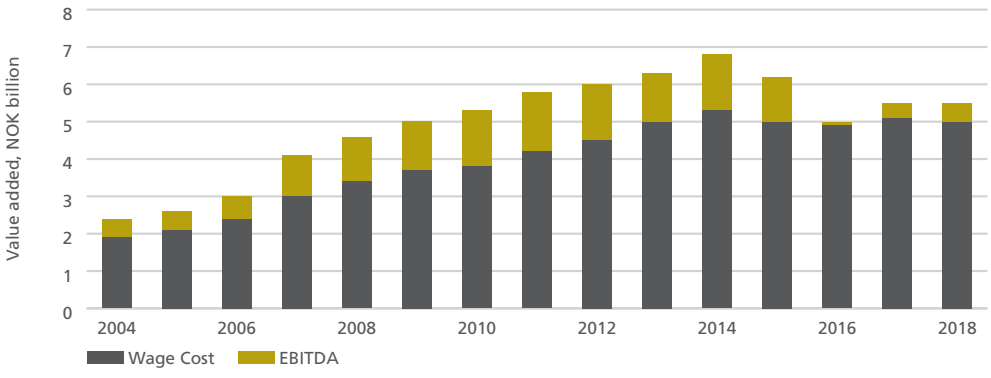


Figure 23 – Value added, divided into wage cost and EBITDA for producers of electrical and electronic equipment. 2004-2018. *Source: Menon Economics*



OTHER OPERATING EQUIPMENT

Figure 24 – Revenue and operating margins for producers of other operating equipment. 2004-2018. *Source: Menon Economics*

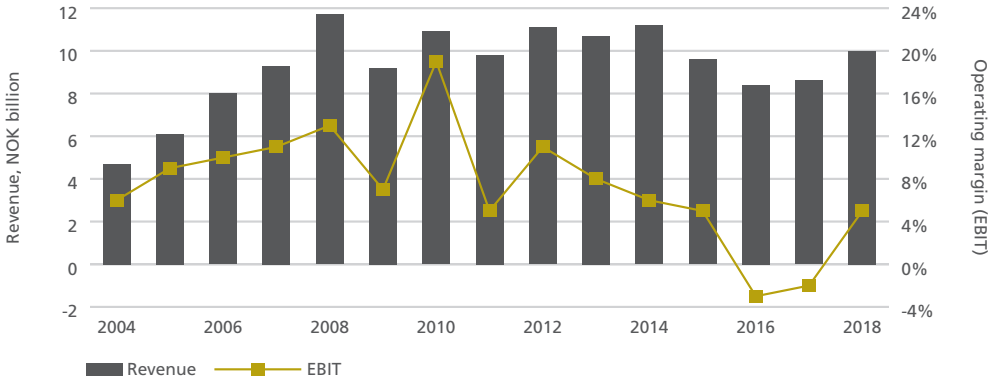
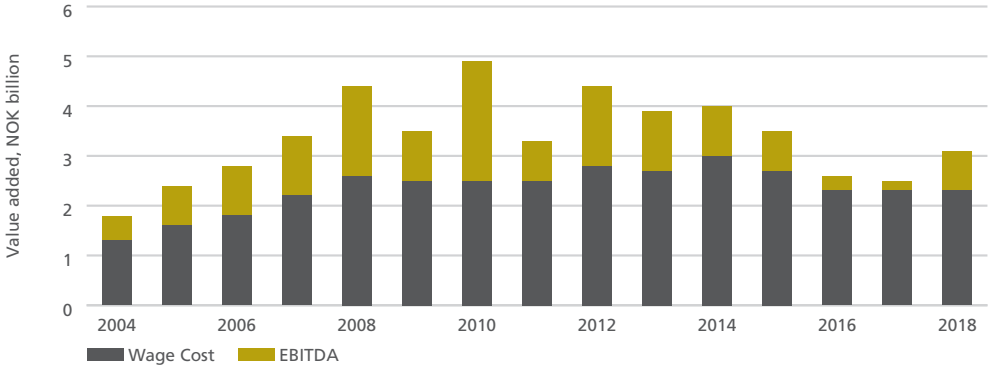


Figure 25 – Value added, divided into wage cost and EBITDA for producers of other operating equipment. 2004-2018. *Source: Menon Economics*



TRADE

Figure 26 – Revenue and operating margins for traders of ship equipment. 2004-2018.
Source: Menon Economics

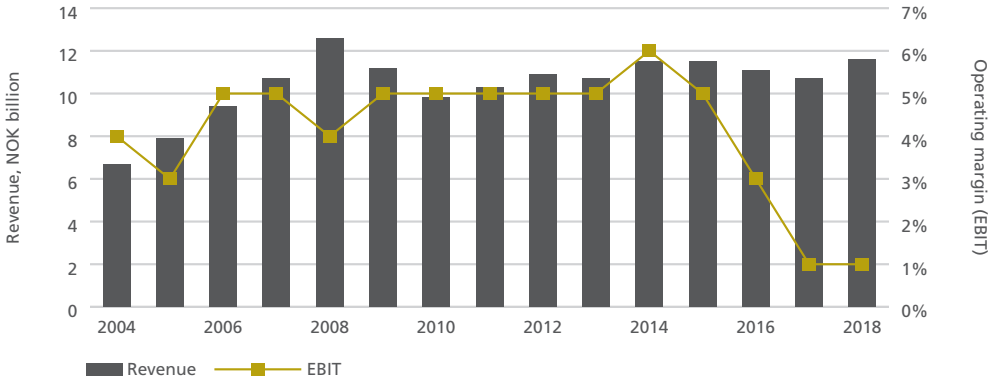
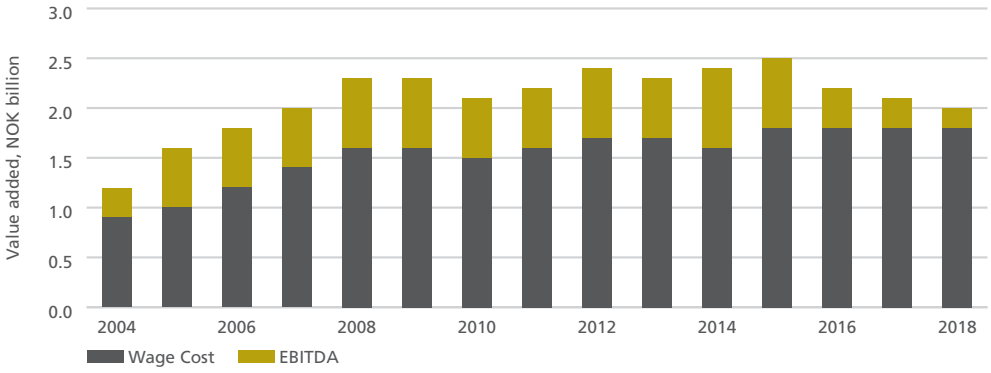


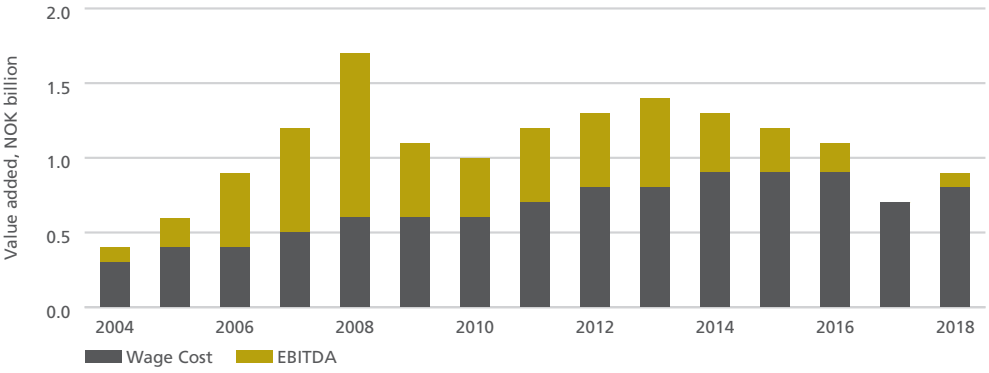
Figure 27 – Value added, divided into wage cost and EBITDA for traders of ship equipment. 2004-2018.
Source: Menon Economics



DESIGN

Figure 28 – Revenue and operating margins for designers. 2004-2018. *Source: Menon Economics*

Figure 29 – Value added, divided into wage cost and EBITDA for designers. 2004-2018.
Source: Menon Economics



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