



FOUNDATION FOR ECONOMIC & INDUSTRIAL RESEARCH

**Marine equipment manufacturing:
Trends, prospects, and contribution to the
Greek Economy**

MARCH 2022

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EXECUTIVE SUMMARY

The member-companies of the Hellenic Marine Equipment Manufacturers and Exporters (HEMEXPO) manufacture innovative, technology-intensive products and services. The low prices and high quality of HEMEXPO products ensure their competitiveness in the global market. Among the comparative advantages of HEMEXPO are the leading role of Greek-owned shipping in the international Water Transport sector and the well-developed Greek coastal shipping, owing its success to the islands and tourism.

The previous HEMEXPO study, conducted by IOBE, highlighted the characteristics of the member-companies and their contribution to the Greek economy¹. It also underlined the challenges that HEMEXPO companies face in both the Greek and the global market.

The emergence of the pandemic, despite the changes it brought in the global supply chain and the international transport sector, did not hurt the development prospects of shipping equipment manufacturing. The contribution of HEMEXPO companies to the Greek economy remains high and international transport of goods seems to be recovering rapidly.

The upward trend of most of HEMEXPO companies' financials stopped in 2020, due to the impact of the COVID-19 pandemic on both the Greek and the global economy. Despite the decline HEMEXPO financials were kept in slightly higher levels compared to 2018.

The pandemic caused a 9.8% reduction in HEMEXPO's turnover in 2020, which reached €340 million; most of it coming from Water Transport sales (shipping and related sub-sectors). Despite the decline in exports in the past few years, HEMEXPO businesses continue to be considered highly extroverted, as 42% of their sales (2020) are channeled to the international market. In 2020, HEMEXPO companies continued the implementation of an investment program concerning fixed equipment purchases, mainly with the use of foreign resources (lending). However, the investment per employee ratio is significantly lower than both Greek and European manufacturing.

Factoring in the interdependencies of sectors of the Greek economy, the contribution of HEMEXPO companies' sales in Water transport is multiplied and reaches (direct and indirect effect) €337 million in 2019; a 45.2% increase compared to 2018. During the first year of the pandemic (2020), sales in Water Transport declined by 11.2% and reached €300 million of domestic value added. The total contribution to employment amounted to 3.1 thousand jobs in 2019 and 3.2 thousand jobs in 2020, having increased by 4.2% in 2019 and 15.5% in 2020 compared to 2018, while the impact on government revenues increased by €47.5 million in 2019 (20.7% annual change) and €41.6 million in 2020 (-12.5% annual change).

Considering the total activity of the HEMEXPO members, the total contribution to Greek GDP exceeded €1.35 billion in 2019, a 5.2% decline compared to 2018. In 2020, the pandemic

¹ Available [here](#) (in Greek)

brought a reduction of the total contribution to GDP which was assessed at €1.32 billion. The contribution to employment remained close to the levels of 2018, as the activity of HEMEXPO supported 19.4 thousand (full time equivalent) jobs in 2019 and 19.7 thousand in 2020. Finally, the contribution to public revenues amounted to €253.3 million in 2019 (10.4% decline compared to 2018) and €225.7 million in 2020 (-10.9% compared to 2019).

Table 1: Contribution of HEMEXPO companies to the Greek economy from Water Transport activity and total activity

	Water transport activity				Total activity			
	2019	2019	2020	2020	2019	2019	2020	2020
	<i>Impact</i>	<i>Multiplier</i>	<i>Impact</i>	<i>Multiplier</i>	<i>Impact</i>	<i>Multiplier</i>	<i>Impact</i>	<i>Multiplier</i>
GDP (€ millions)	337	1.4	300	1.4	1.354	2	1.320	1.9
Employment (in FTE)	3.056	4.1	3.184	4	19.486	7.2	19.697	7
Public revenue (€ millions)	48	2.3	42	2.1	253	4.1	226	3.6

Sources: IOBE calculations based on HEMEXPO and ELSTAT data

HEMEXPO companies continued to hire employees during the first year of the pandemic (2020), anticipating a gradual improvement of the global economy. However, the companies continue to face difficulties in filling certain job positions, especially those that require specific skills and are linked to specific stages of the production process. As a result, the firms do not reach their productive potential, making them less competitive in both the Greek and the global market.

Approximately 40% of HEMEXPO employees participate in professional training programs. However, the professional categories with the largest technical skill deficiencies, participate less in such programs.

An important finding of the study, related to the labor market shortage and the lack of basic skills among the existing staff, is that collaboration between the firms and the Greek educational institutions is limited.

Bridging the gap between supply and demand in the labor market requires a series of actions by HEMEXPO companies, such as identifying those university departments producing graduates that could supply with young professionals, cooperating with educational institutions to help design curricula catering to the needs of the job market, and improving their marketing & communications strategy to university students and other potential employees.

Cooperation with educational institutions can be further enhanced by HEMEXPO activities that will provide internship and apprenticeship opportunities to university seniors and recent graduates. Creating a dedicated fully-funded by HEMEXPO internship program would go a long way towards that direction. The program should involve participation incentives to limit the

number of young professionals steering off to other industries, which are often unrelated to their studies.

Furthermore, the collaboration of the HEMEXPO firms with the Greek universities can improve the skills of HEMEXPO's existing personnel further. However, this calls for an integrated approach that will increase the participation of HEMEXPO staff in state and/or HEMEXPO designed professional training programs. These programs should be selected to cover skill gaps of those professional categories with the highest needs.

1. PURPOSE OF THE STUDY

The firms that are members of HEMEXPO (Hellenic Marine Equipment Manufacturers and Exporters) are producing innovative and technology intensive products and services in competitive prices and quality, on a global scale. Comparative advantages of HEMEXPO include the leading role of Greek-owned shipping in the international Water Transport sector and the well-developed Greek coastal shipping, owing its success to the islands and tourism.

The previous HEMEXPO study, conducted by IOBE, highlighted the characteristics of the member-companies and their contribution to the Greek economy². It also underlined the challenges that HEMEXPO companies face in both the Greek and the global market.

The emergence of the pandemic, despite the changes it brought in the global supply chain and the international transport sector, did not hurt the development prospects of shipping equipment manufacturing. The contribution of HEMEXPO companies to the Greek economy remains high and international transport of goods seems to be recovering rapidly.

The objectives of the study are a) to update the economic impact assessment of the HEMEXPO firms for the Greek economy based on the latest available data, taking under consideration the effect of the pandemic, b) to identify the new challenges for the companies of HEMEXPO and c) to formulate a set of proposed measures to improve the companies' competitiveness further in the Greek and global market.

The second chapter of the study includes a description of the trends of HEMEXPO financials for the 2013-2020 period (turnover, exports, employment etc) and a comparison with the Greek and European manufacturing sector.

The third chapter presents the economic impact of the HEMEXPO firms in the Greek economy. The use of the input/output model that has been developed by IOBE for the Greek economy quantifies the contribution of the HEMEXPO firms in terms of value added, GDP, employment, contribution to the public revenues taking under consideration the multiplying effects in interconnected sectors and in the Greek economy. Since the HEMEXPO firms supply equipment and services in the Water Transport and in other sectors, the impact assessment is taking place in two dimensions assessing the impact from the sales in the Water Transport, which is HEMEXPOs main client and from the sales in all economic sectors.

One of the fundamental challenges of the shipping equipment manufacturing, identified in the 2020 study, is related with the gap between labour supply and demand that results in a shortage of employees in the HEMEXPO firms and, consequently, in competitiveness losses. The HEMEXPO companies have to deal with the development of human capital, since this will drive the competitiveness of the products and services not only in the Greek but also in the global market. In that sense, the fourth chapter refers to the qualitative and quantitative

² Available [here](#) (in Greek)

characteristics of a relevant survey implemented by IOBE. The chapter concluded with a set of suggestions for the sustainable development of human capital in the HEMEXPO firms.

2. THE FINANCIALS OF HEMEXPO COMPANIES

2.1 Introduction

This section presents an analysis of HEMEXPO companies' financials from 2013 to 2020. The relevant indexes and figures were compiled using the ICAP database, Data.Prisma, which includes published balance sheets of HEMEXPO companies. Moreover, IOBE designed a questionnaire-based survey and surveyed 20 members of HEMEXPO.

HEMEXPO member companies are active in several manufacturing, trade, and services sectors. Indicatively, the activities of HEMEXPO include the production of specialized mechanical equipment, installation and maintenance services on ships, as well as all kinds of services related to the construction, conversion, and maintenance of ships and shipping structures (e.g. ports).

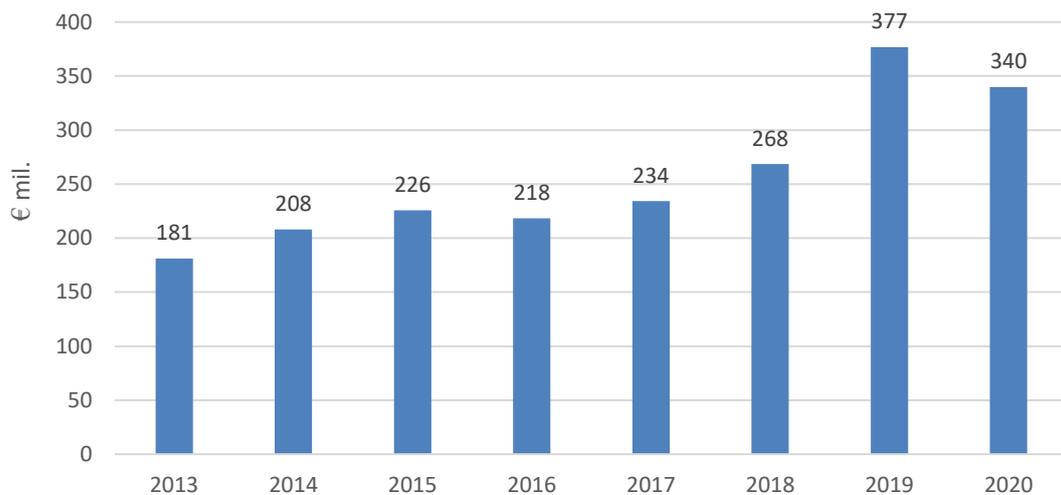
Figure 2.1: Activity of the member companies of HEMEXPO in the sectors of the Greek economy



2.2 Main figures

HEMEXPO's turnover exhibited an upward trend from 2013-2020. It reached its peak, €377 million, in 2019; a 40.7% increase compared to the previous year. In 2020, the first year of the COVID-19 pandemic, turnover fell by 9.8%, mainly due to the imposition of restrictive measures that led to a slowdown in global shipping and overall economic activity, especially in the first 6 months. Total turnover in 2020, however, was higher than in 2018. By the end of 2020, the sales of HEMEXPO companies had increased by 87.6% compared to the beginning of the study period (2013).

Figure 2.2 HEMEXPO turnover

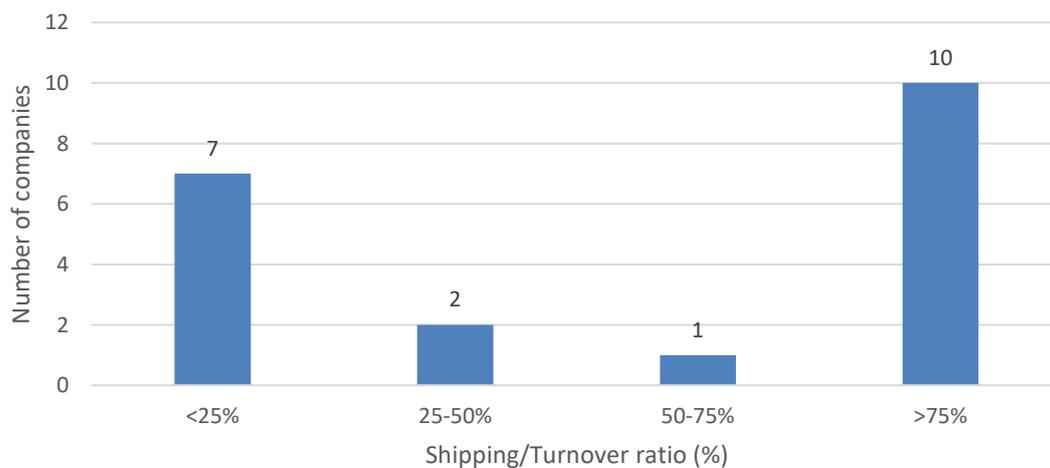


Source: Data.Prisma Note: A HEMEXPO member, whose turnover is more than twice as high as that of all other members combined, has been excluded from the estimates.

The percentage of turnover from sales in shipping was higher in 2020 compared to 2018. Approximately 59% of total sales came from serving the demand of the broader Water Transport sector (mainly from coastal shipping, as well as services auxiliary to the operation of relevant infrastructure, i.e. ports). According to the latest data, shipping remains the sole customer for almost half of the companies in the sample.

As far as exports are concerned, the previous upward trend is reversed from 2019 onward. In 2020, approximately 42% of sales constituted exports (€307.1 million), while that figure was 50% in 2018. The reasons for this decline are related both to the decrease in prices of specific HEMEXPO products, and to the broader decrease in demand that was particularly evident in the first half of 2020, due to the pandemic.

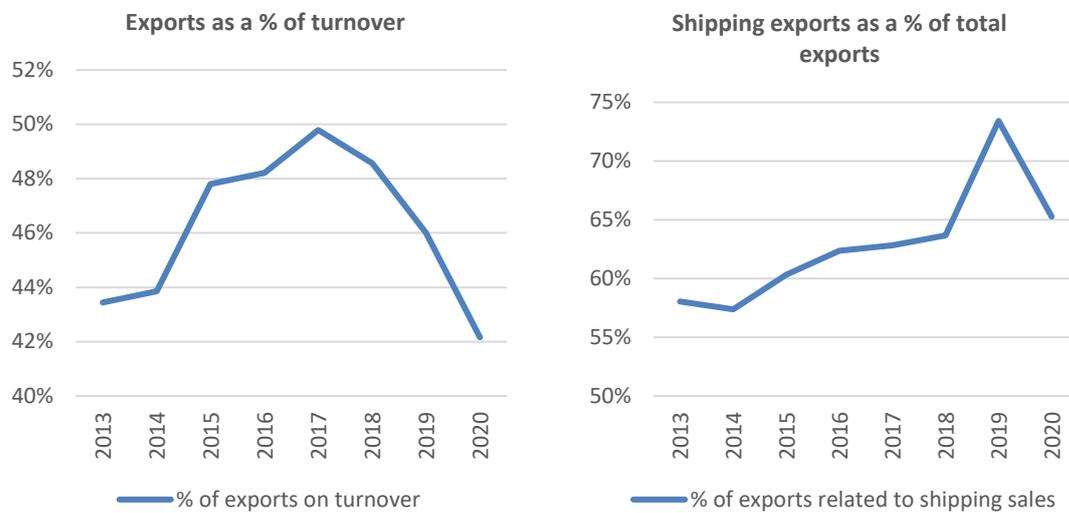
Figure 2.3: Shipping sales as a percentage of total turnover



Source: IOBE research

The percentage of exports to the Water Transport sector were reduced to 64.3% in 2020 from 73.4% the year before.³

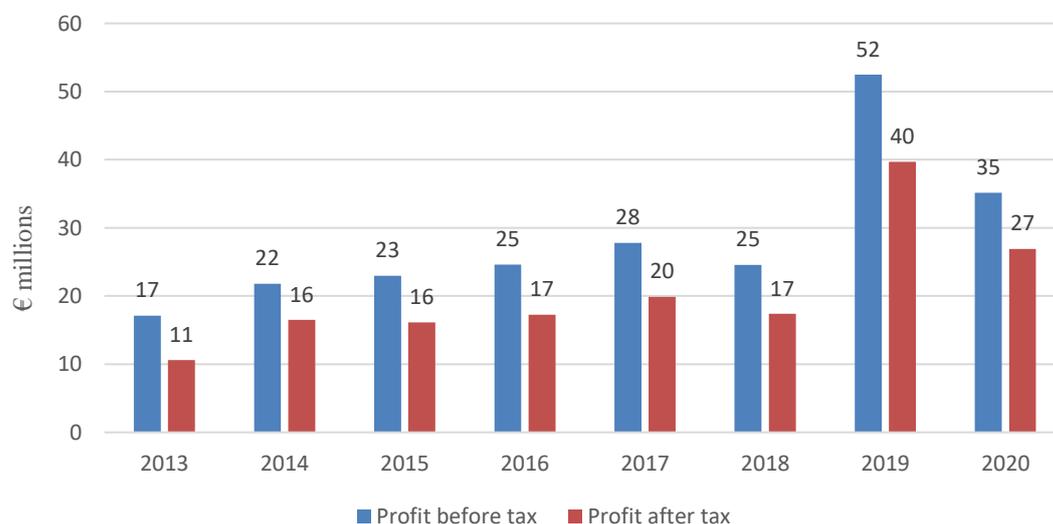
Figure 2.4 Exports of HEMEXPO companies



Source: IOBE

Profits after tax (Figure 2.5) increased significantly in 2019 (+135%) but they declined by 32.5% the following year because of the pandemic. Despite the large decline, profits after tax were still higher in 2020 compared to 2018, mostly due to the reduction of tax rates in 2020.

Figure 2.5 Profitability of HEMEXPO businesses

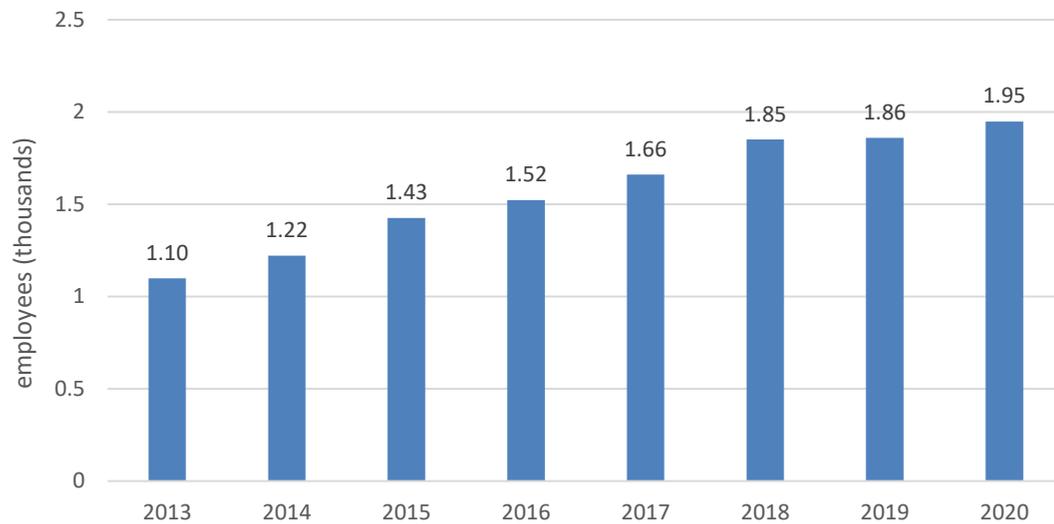


Source: Data.Prisma

³ It is crucial to continue monitoring the volume of exports after the pandemic to determine whether the noted decrease is due to external factors or endogenous characteristics of HEMEXPO companies.

The upward trend in employment continued during the first year of the pandemic. In 2020, HEMEXPO's employees increased by 4.8%, reaching 1.95 thousand (Figure 2.6 **Error! Reference source not found.**). Most companies intend to continue increasing their personnel in the future. More information on employment is provided in the third chapter, below.

Figure 2.6 Number of employees in HEMEXPO businesses



Source: IOBE, Data.Prisma. Note: A HEMEXPO member, whose turnover is more than twice as high as that of all other members combined, has been excluded from the estimates.

2.3 Figures and indicators

The following table summarizes HEMEXPO companies' financials from 2013-2020. The upward trend recorded since the beginning of the study period stops in 2020, the first year of the COVID-19 pandemic. However, most reported figures and indicators were higher in 2020 compared to 2018.

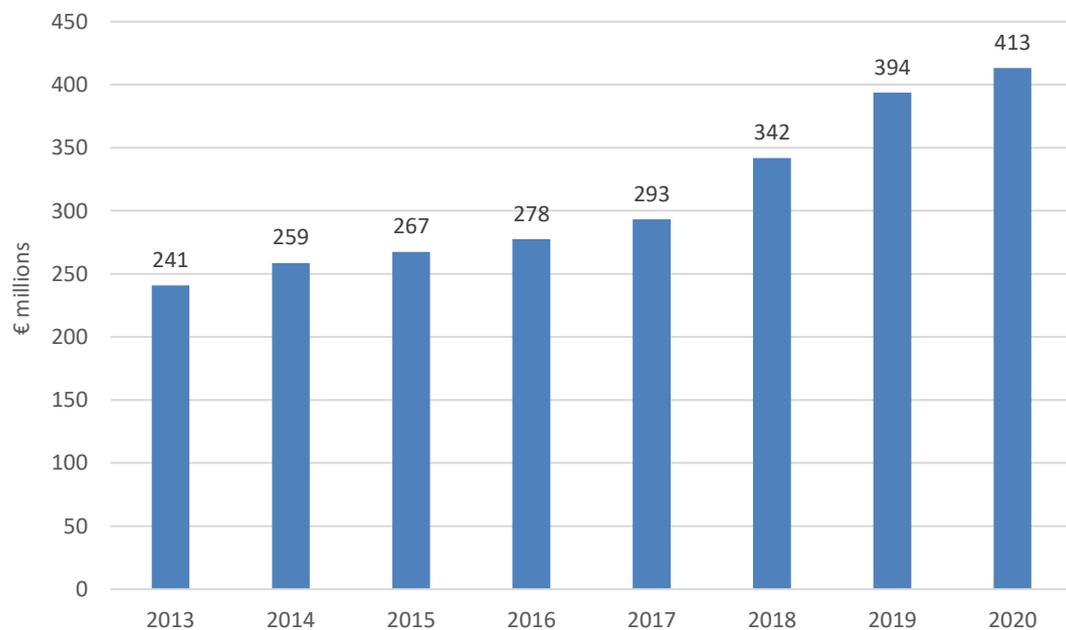
Net asset value (Figure 2.7), which represents the total financial resources available to companies for the production and distribution of products and services, increased by 71.5% during the study period. This trend is reflected in accounts receivable (AR), a key component of the net asset value (Figure 2.8). AR increased every year besides 2016 and 2020. The largest increase in AR, 27.8%, was recorded in 2019. In 2020, AR decreased by 8.5%. Changes in AR are also related to the credit periods granted to HEMEXPO's business customers.

Table 2.1 Summary of key financial statistics of HEMEXPO companies

	2013	2014	2015	2016	2017	2018	2019	2020
Turnover (€ millions)	181,2	208,1	225,6	218,3	234,3	268,5	376,7	339,9
Cost of goods (€ millions)	125,9	146,6	158,2	150,9	158,4	190,6	262,4	248,1
Net assets (€ millions)	76,6	80,2	85,2	91,2	94,7	100,4	113,1	126,0
Total assets (€ millions)	241,0	258,6	267,4	277,5	293,3	341,8	393,7	413,3
EBITDA (€ millions)	22,9	25,0	29,4	29,3	32,7	31,1	54,6	41,0
Profit before tax (€ millions)	17,1	21,8	23,0	24,6	27,8	24,6	52,5	35,2
Employment	1.099	1.221	1.426	1.522	1.661	1.851	1.860	1.949
Investment (€ millions)	2,5	2,5	2,8	2,2	5,0	5,0	1,0	1,0
Equity (€ millions)	150,9	154,9	163,8	179,8	178,0	198,7	234,1	223,7

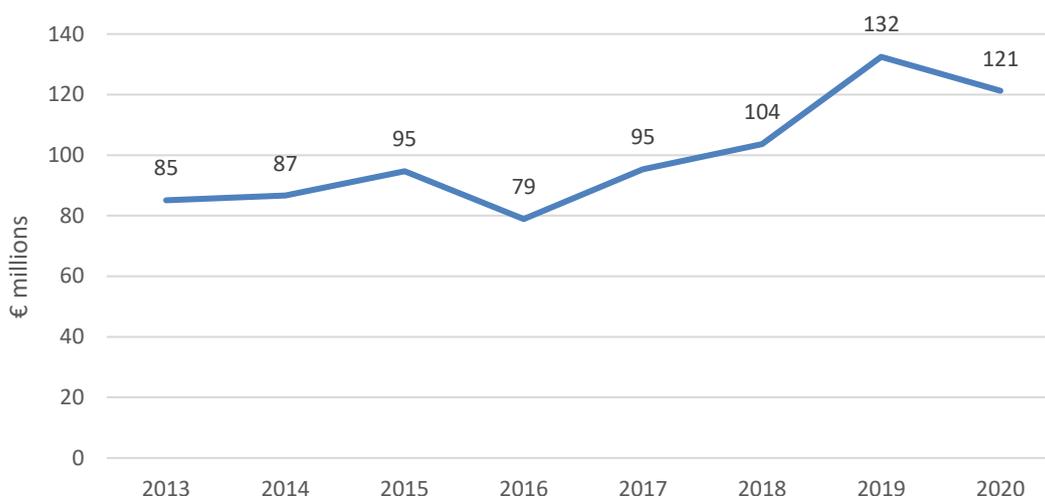
Source: Data.Prisma

Figure 2.7 Total assets of HEMEXPO businesses



Source: Data.Prisma

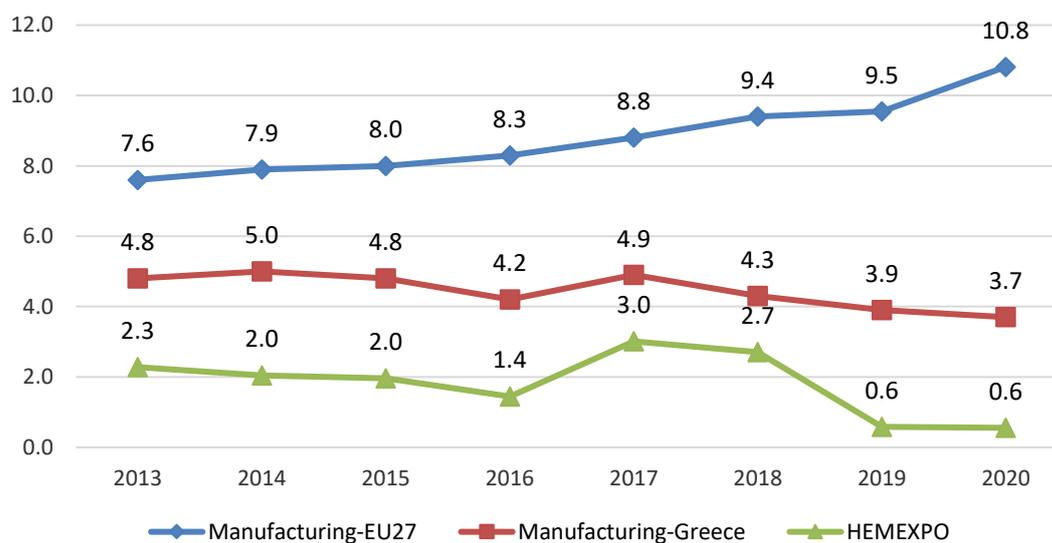
Figure 2.8 HEMEXPO's total receivable accounts



Source: Data.Prisma

The steady growth in most figures resulted in a large boost of investment, which exhibited a more than twofold increase in 2017 and 2018, exceeding €5 million per year. Subsequently though, total investment declined to historically low levels, reaching approximately €1 million in 2019 and 2020. Consequently, a similar trend appears in the investment per employed person index, which has always been below the Greek and EU27 manufacturing indices. The index for manufacturing declined in Greece, while it increased in the EU27, widening the gap (Figure 2.9).

Figure 2.9 Investment per employed person index for HEMEXPO; comparison with manufacturing in Greece and EU27

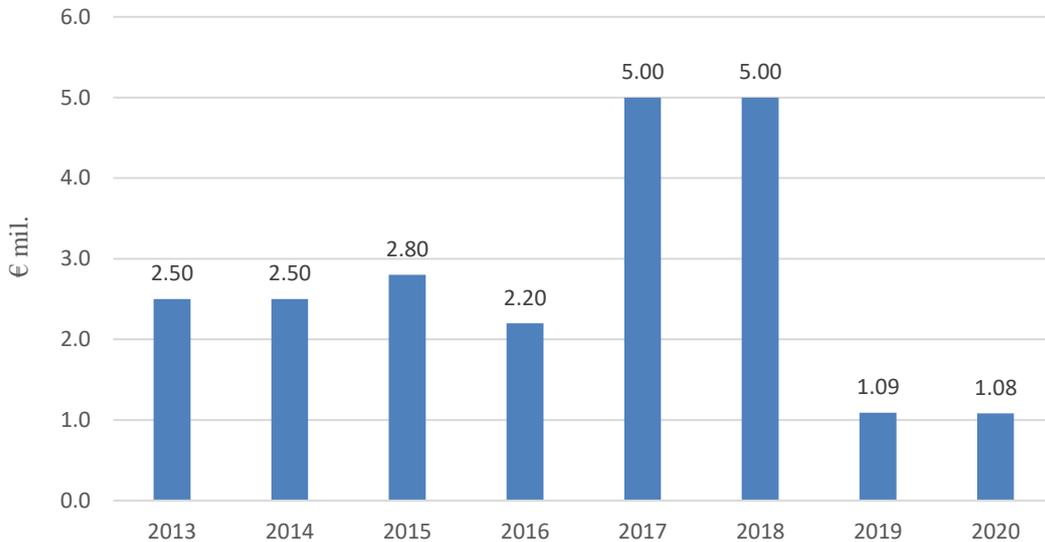


Source: Eurostat, IOBE

However, the decrease in investment in the 2019-2020 period is not in line with the trends noted in other indicators linked to investment and operational expenses. For example, net

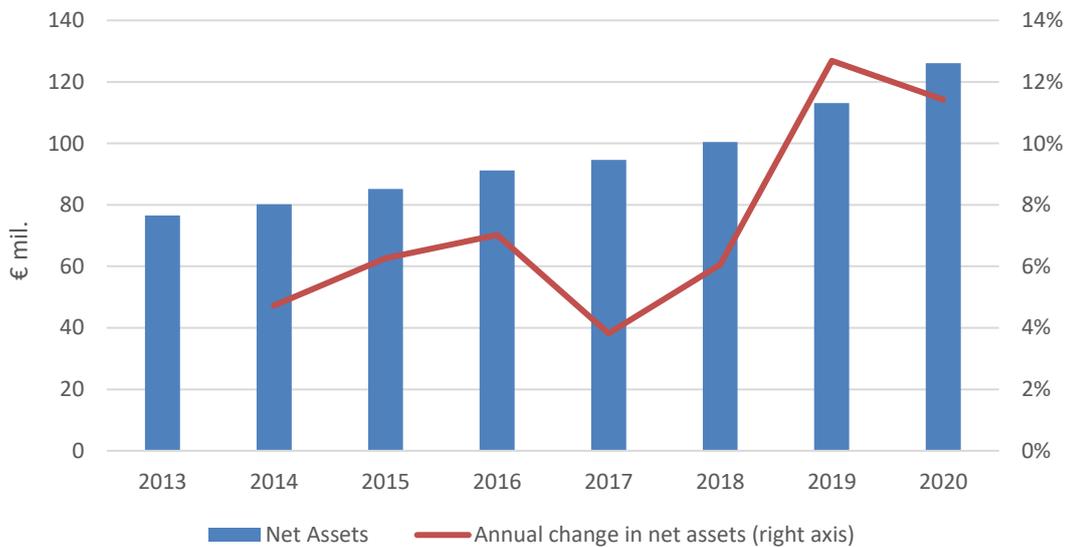
assets (NA) increased every year since 2013. A 12.7% increase was recorded in 2019 and a 11.4% increase in 2020, reaching €120 million (Figures 2.10 and 2.11).

Figure 2.10 Investment in HEMEXPO companies



Source: IOBE

Figure 2.11 Evolution of net assets and annual change



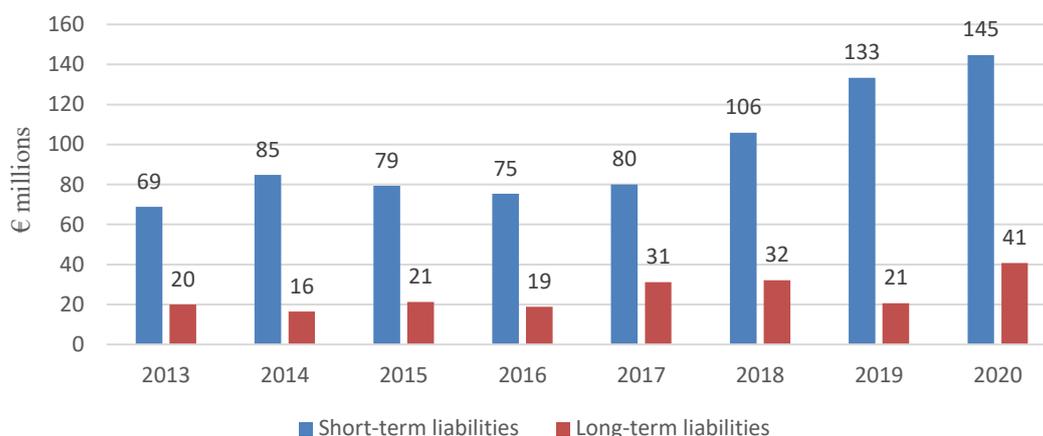
Source: Data.Prisma, Data processing: IOBE

Long-term liabilities (more than 12 months), which include long-term equipment leasing, real estate, and land loans among others, almost doubled in 2020 (95.0% annual increase). In addition, 25.5% and 9.0% increases were recorded in short term liabilities (less than 12 months) in 2019 and 2020, respectively (Figure 2.12). These include liabilities to suppliers, accrued expenses, taxes, dividends, as well as short-term loans. It is possible that the increase in short-term liabilities is the result of increased credit from HEMEXPO suppliers and loans (e.g. purchase of low value fixed equipment).

Debt (Figure 2.13) increased in both 2019 and 2020, and remains at a significantly higher level compared to 2018. These figures serve as further evidence that borrowing increased significantly during this period. At the same time, the corresponding index for Greek manufacturing decreased.

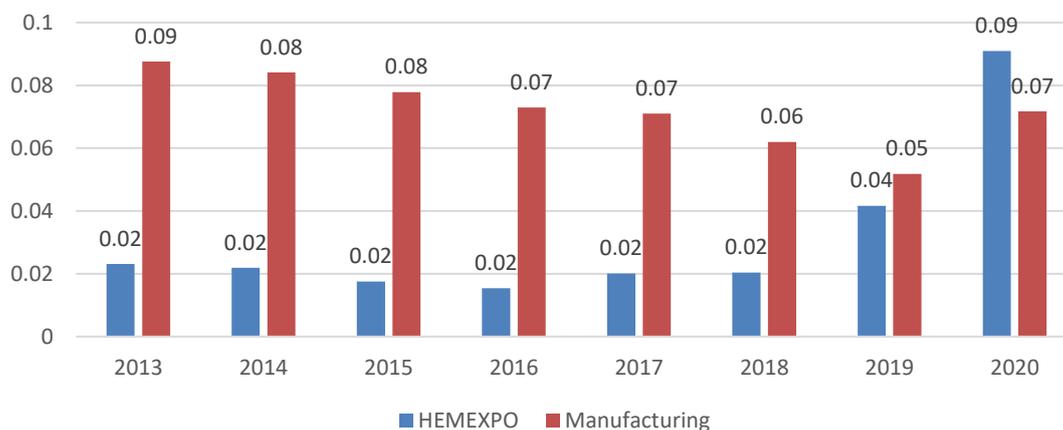
From the data presented so far, it is concluded that investment-related data received by the HEMEXPO firms are underestimated. There are strong indications that productive investment increased throughout the study period and that they have been realized through the use of foreign capital (lending).

Figure 2.1 Total short-term and long-term liabilities of HEMEXPO



Source: Data.Prisma

Figure 2.2 Debt index, comparison of HEMEXPO companies with Greek Manufacturing

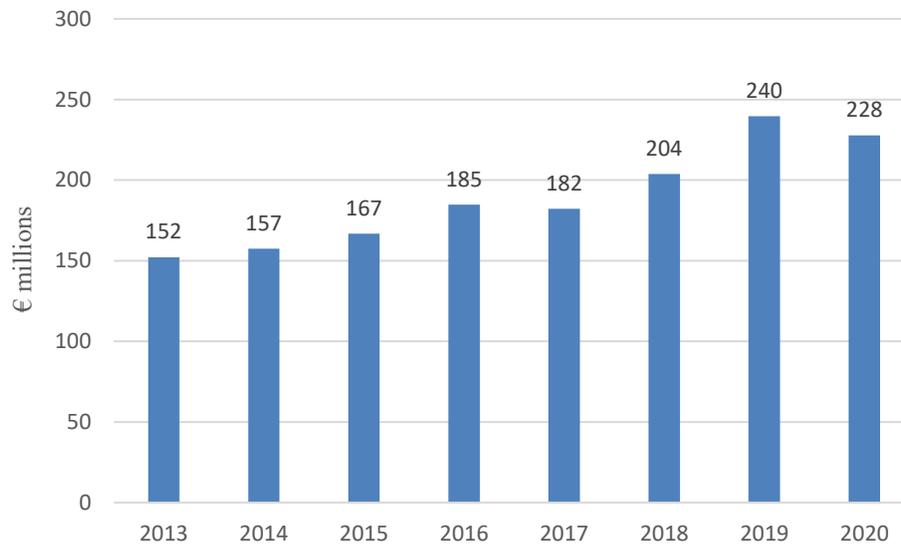


Source: Data.Prisma, Data processing: IOBE

The net position of HEMEXPO companies, which reflects the relationship between current assets and total liabilities (long-term and short-term), remained positive throughout the study period. Despite the increase in liabilities, the net position has been improving since 2013, due to the increase in total assets (Figure 2.14). The upward trend stopped in 2020 due to the

pandemic; instead there was a small decrease (from €240 million in 2019 to €228 million in 2020).

Figure 2.3 Net position of HEMEXPO



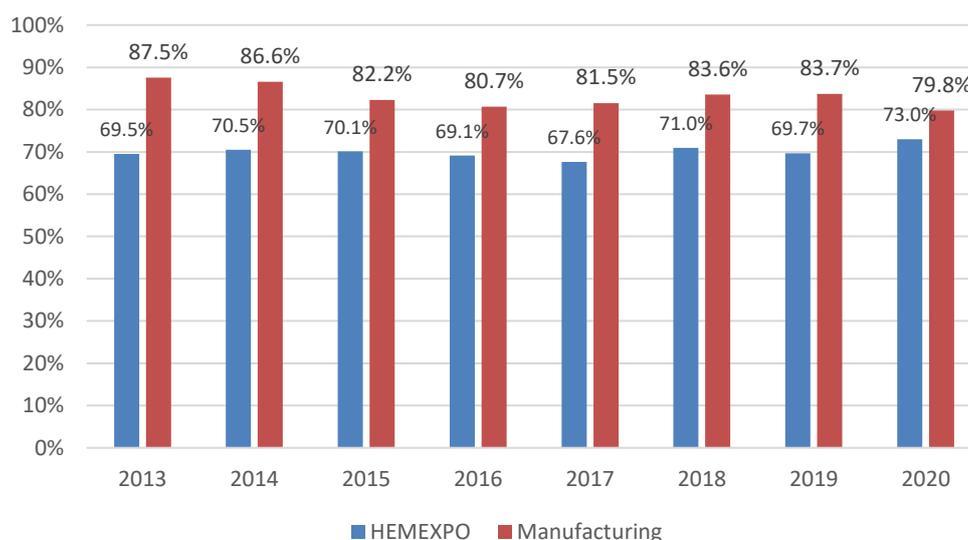
Source: Data.Prisma, Data processing: IOBE

The cost of goods sold (Figure 2.15) is significantly lower than the average cost of goods in Greek manufacturing, making HEMEXPO's companies more competitive on a global scale. This index increased from 69.7% in 2019 to 73.0% in 2020.

It is crucial that the cost of goods continue to remain low. As highlighted in a previous study conducted by IOBE, competition, mainly from Asian countries such as China and South Korea, is intense. This is both due to lower production costs and the protectionist conditions in Japanese, Chinese, and South Korean markets (i.e. distortionary subsidies, import duties, etc.).

Limiting the cost of goods sold -on the condition that quality remains unchanged- and offering longer credit periods can be some of the factors that will create a larger buffer to ensure that the products and services of HEMEXPO can overcome the above-mentioned barriers in the global market.

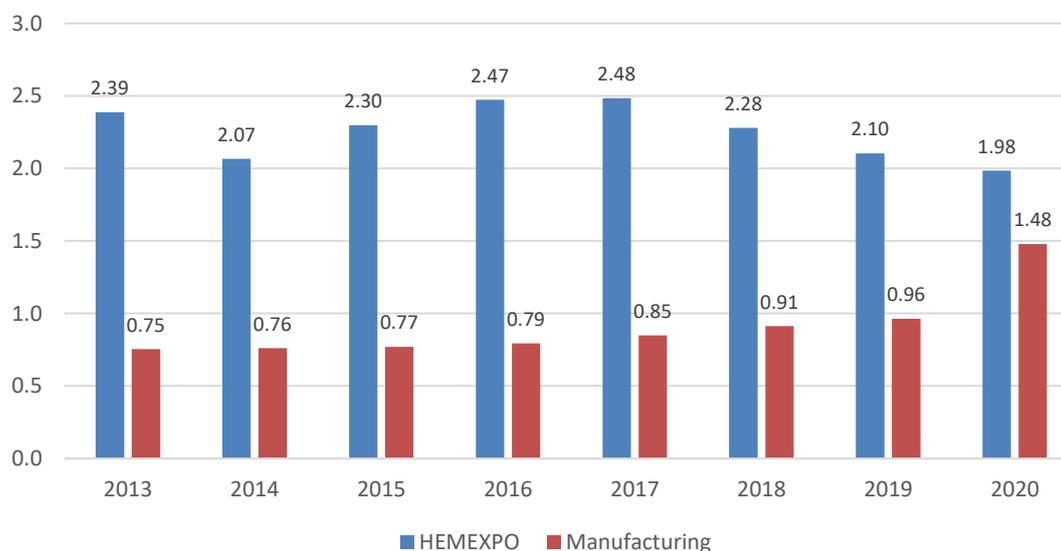
Figure 2.4 Cost of HEMEXPO companies, as a percentage of turnover



Source: Data.Prisma, Data processing: IOBE

The general liquidity ratio, which measures the ability of companies to meet their short-term liabilities, is higher than the corresponding ratio of the Manufacturing sector throughout the entire period. However, in both 2019 and 2020 the index declined, mainly due to the significant increase in short-term liabilities. On the other hand, the reduction of the average liabilities of the Manufacturing sector pushed the Manufacturing index upwards, bringing it closer to HEMEXPO's levels.

Figure 2.5 General Liquidity Ratio, HEMEXPO companies and Manufacturing

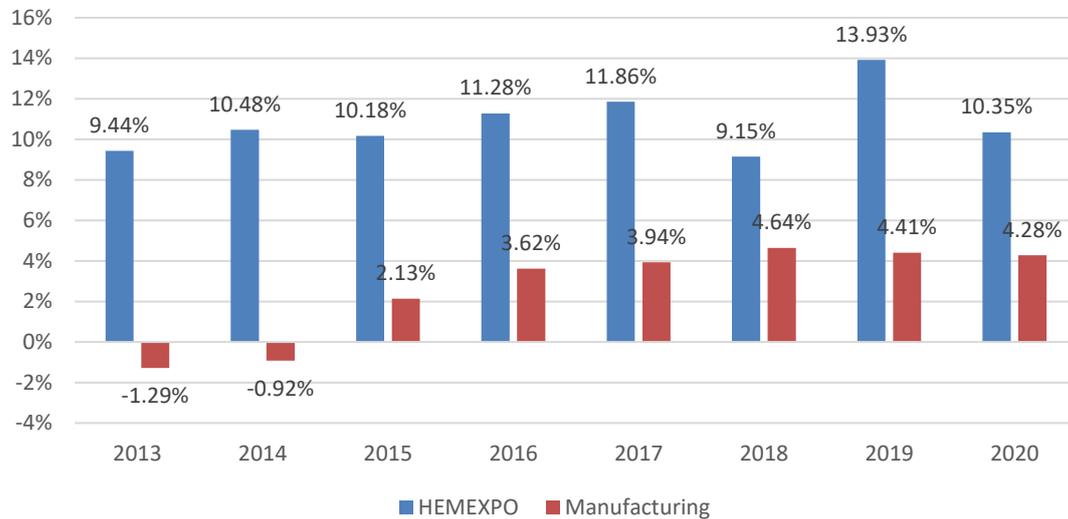


Source: Data.Prisma, Data processing: IOBE

The pre-tax profit margin of HEMEXPO remains significantly higher than the corresponding margin of the Manufacturing sector. This indicator increased by 13.9% in 2019 and declined by 9.2% in 2020 (Figure 2.17).

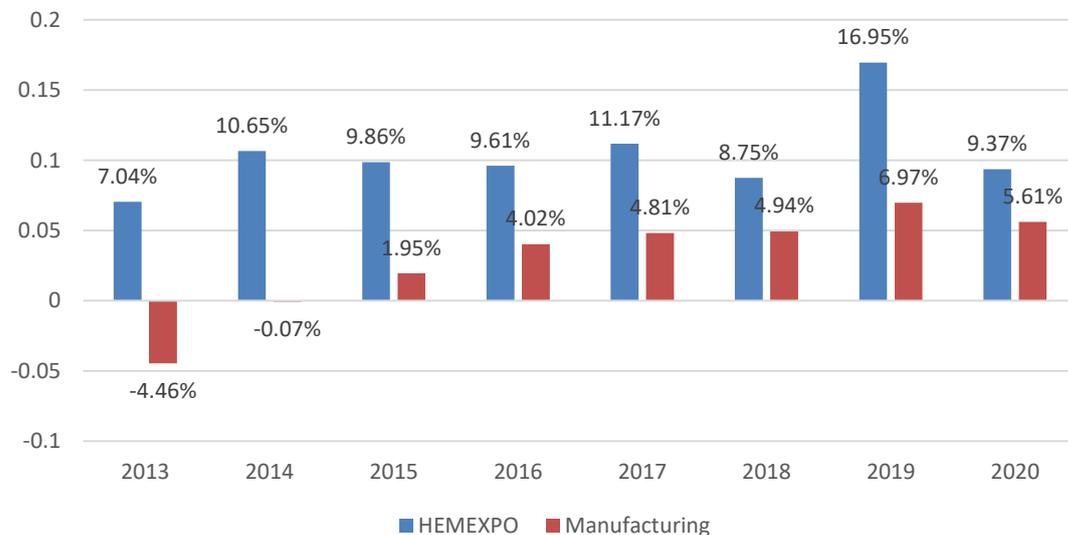
Another interesting indicator, related to profitability and share capital effectiveness, is the return on equity ratio. This ratio (net profit/equity) increased to 16.9% in 2019 and fell to 20.3% in 2020 (Figure 2.18). The index remains at a higher level than that of the Greek Manufacturing sector which did not change from 2017-2020.

Figure 2.6 Profit margin before taxes, HEMEXPO and Greek Manufacturing



Source: Data.Prisma, Data processing: IOBE

Figure 2.7 Return on Equity (ROE) Index, HEMEXPO and Greek Manufacturing



Source: Data.Prisma, Data processing: IOBE

2.4 Conclusions

The upward trend of most of HEMEXPO companies' financials stopped in 2020, due to the impact of the COVID-19 pandemic on both the Greek and the global economy. Most indicators fall back to the 2018 levels.

Turnover declined by 9.8% in 2020 and reached €340 million; most of it came from sales in the Water Transport sector (shipping and related sub-sectors). Despite the decline in exports

compared to the past, HEMEXPO companies continue to be considered highly extroverted, as 42% of their sales are still channeled to the international market. In addition, HEMEXPO's companies continued in 2020 with the implementation of an investment program that mainly concerns purchases in fixed equipment, mostly funded by foreign resources (lending). However, investment intensity remains lower than in Greek and European manufacturing.

The number of employees of HEMEXPO companies grew steadily during the study period, reaching 1.95 thousand people in 2020. Most companies intend to continue increasing their personnel in the future.

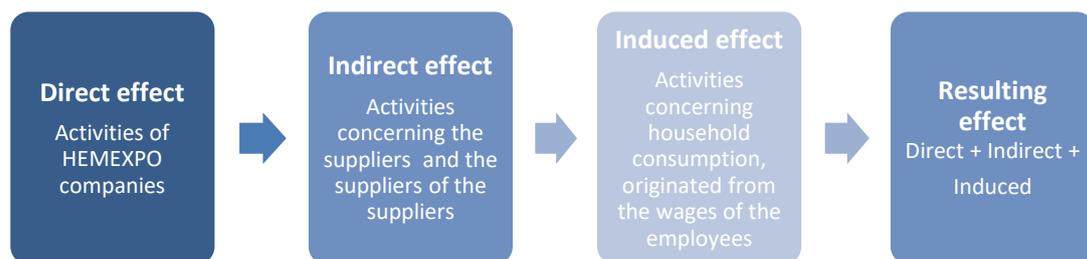
Profit-wise, HEMEXPO's companies continue to do well and rank significantly higher compared to the average profits of the Greek manufacturing sector.

3. HEMEXPO'S ECONOMIC IMPACT

3.1 Introduction

The impact of the economic activity of an industry or a group of companies is an important tool for examining the wider contribution to the Greek economy. The contribution to the economy is studied in terms of the most significant economic aggregates, such as GDP, added value, jobs, government revenues, etc. These aggregates are considered in three dimensions of economic impact: the direct, the indirect and the induced one. The direct impact is defined as that which is directly involved with the economic activity of the industry/business unit. The indirect impact is created by the financial transactions with the suppliers, while the induced one arises as a result of the expenditure of the household income that is created directly and indirectly from the activity of the industry. Finally, the resulting effect is the sum of the direct, indirect and the induced impact

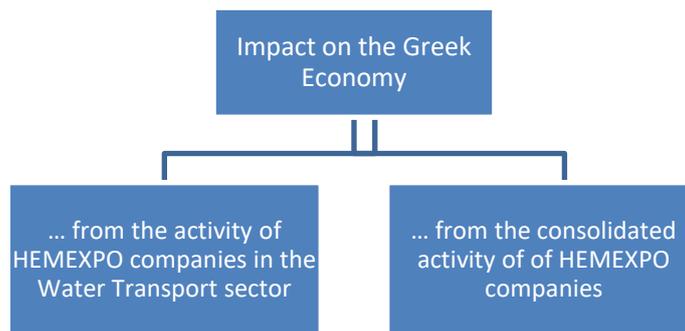
Figure 3.1 Estimation methodology of the economic impact of HEMEXPO companies



Source: Input/Output Model, IOBE

In the case of HEMEXPO, the impact on the Greek economy takes into account the activity of member companies, their operating and investment expenses for domestic goods for the years 2019-2020 and how the above affect the economy, in total.. The model assesses the impact in the economic aggregates of the Greek economy in case HEMEXPO companies cease their activity. The direct and multiplier effects (indirect and induced) are calculated with the input-output model developed by IOBE for the Greek economy, which takes into account the interdependencies of the sectors of the economy resulting from the operation of HEMEXPO companies. Although most of the products are sold to the Water Transport sector, the majority of the companies supply goods and services to other sectors too. For this reason, but also to allow the comparison with the results of the 2020 study, it was deemed appropriate to evaluate the impact from the sales to the Water Transport sector separately, which in Greece mainly concerns seagoing shipping and coastal shipping, as well as the impact from the overall HEMEXPO activity (all sectors).

Figure 3.1 Estimation methodology of the impact of HEMEXPO companies on the Greek economy



For this purpose, a survey was conducted to collect quantitative and qualitative data from HEMEXPO's companies. The aim of the survey was to identify the relationship of each company with the rest of the economic sectors of the Greek economy (suppliers). The analysis uses economic aggregates and the input-output tables for every study year (2019-2020).

Sixteen companies participated in the survey; while for the four additional HEMEXPO members, the requested data were obtained from the Data.Prisma database.

3.2 The economic impact of HEMEXPO from sales to the Water Transport sector.

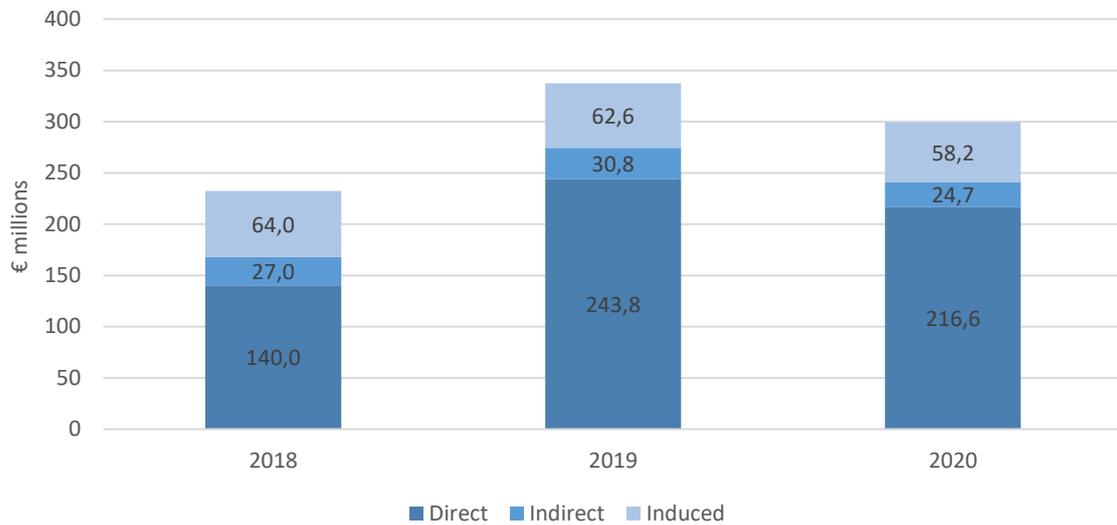
In this section, we estimate the economic footprint of the HEMEXPO companies to the Greek economy generated from their sales in the Water Transport sector (Figure 3.3) for 2019 and 2020. The results of this exercise are compared with the footprint of the year 2018, as this have been assessed and presented in an older IOBE study⁴. In particular, taking into account all the interactions with the Greek economy, the activity of HEMEXPO companies generated by the sales in Water Transport in 2019, created GDP of €243.8 million (direct effect). Also, the activity of suppliers, covering the demand for products and services from the HEMEXPO firms generated an additional amount of €30.8 million (indirect effect). The induced impact on GDP due to household expenditure, fueled by wages that are offered by HEMEXPO companies and their supply chain amounted to €62.7 million. The total impact from the sales to the Water Transport sector accounted to €337.0 million (approximately 0.18% of total GDP). The total contribution to GDP was increased by 45.2% compared to 2018, mainly due to the significant increase in economic activity and in the profitability of the HEMEXPO companies. The above has not affected the HEMEXPO operating expenses mostly due to the use of inventories but also to a possible improvement in the efficiency of the production processes.

However, the impact of reduced demand due to the pandemic is reflected in the assessment of the economic footprint for 2020. The overall impact from the sales in Water Transport was reduced by 11.2% and amounted to €299 million (0.18% of GDP). More specifically, the direct effect, amounted to €217 million, having been reduced by 11.1% compared to 2019, while a decrease of 19.8% was recorded in the indirect effect. The induced effect, which is the effect of household income expenditure, is lower

⁴ Manufacturers of maritime equipment: trends and prospects 2020

than that of the past, despite the fact that the other effects were retained at higher levels than these of 2018. This is related to changes in household consumption behavior and the general reduction in consumer spending on domestic products in the first year of the pandemic.

Figure 3.2 Contribution to GDP, from HEMEXPO sales in Water Transportation, 2018-2020

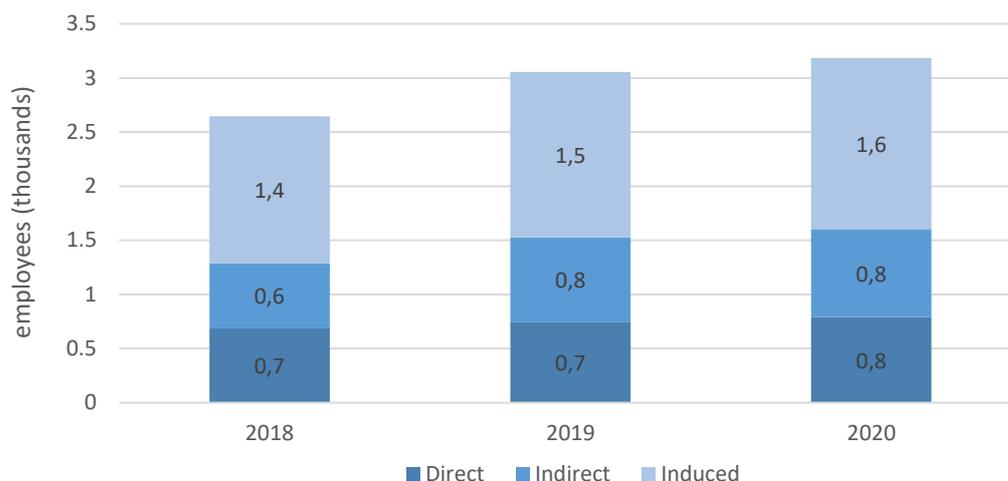


Source: IOBE estimations based on HEMEXPO and ELSTAT data

The impact on employment from the sales in the Water Transport sector increased by 19.2% in 2019 and by 3.2% in 2020, and accounted to 3.1 thousand and 3.2 thousand jobs respectively. The increase in the employment among the HEMEXPO companies is linked both to their expectations for limited losses during the pandemic and also to the employment protection programs implemented by the State. (Figure 3.4).

More specifically, the activity covering the Water Transport demand in 2019 offered 686 full-time jobs (direct impact), approximately 786 jobs along the supply chain of HEMEXPO companies (indirect impact) and 1.5 thousand jobs due to the effect of the households income expenditure (induced effect). In 2020, the relevant footprint from the sales in the Water Transport sector was estimated to 792 jobs (direct impact), 811 jobs (indirect effect), and 1.6 thousand jobs (induced effect).

Figure 3.3 Contribution to employment from HEMEXPO sales in Water Transport, 2018-2020

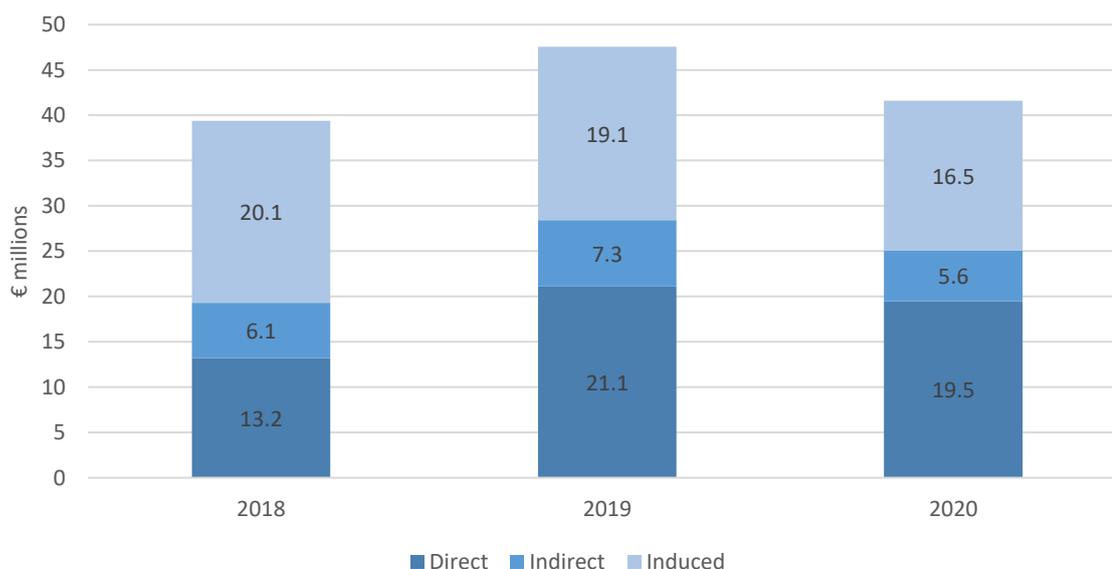


Source: IOBE calculations based on HEMEXPO and ELSTAT data.

The HEMEXPO businesses contribute to public revenues through taxes and employer contributions. The total contribution to public revenues from the HEMEXPO activity in Water Transport increased in 2019 by 20.5% on an annual basis, while in 2020 it was reduced by 12.5%.

Especially in 2019, the direct effect on public revenues amounted to €21.1 million, while the contribution of the activity along the supply chain of HEMEXPO companies (indirect effect) exceeded the amount of €7.3 million. Finally, the household income expenditure generated another €19.3 million (induced effect). Respectively, in 2020 the direct effect decreased to €19.5 million, the indirect to €5.6 million and the induced to €16.5 million.

Figure 3.4 Contribution to public revenue, from HEMEXPO sales to the Water Transport sector, 2018-2020



Source: IOBE estimations based on HEMEXPO and ELSTAT data

3.3 Estimation of the contribution of HEMEXPO businesses to the Greek economy

In 2019, the direct contribution of HEMEXPO businesses to the Greek economy (as measured by total sales) was estimated at €662 million, while approximately €301 million were generated due to increased activity along the supply chain. The impact from higher household spending was €391 million (induced effect). Therefore, the total impact amounted to €1.35 billion (or approximately 0.74% of Greece's GDP in 2019), recording a 5.2% decrease compared to 2018. The decline resulted because of the reduction in the indirect and induced effects in 2019.

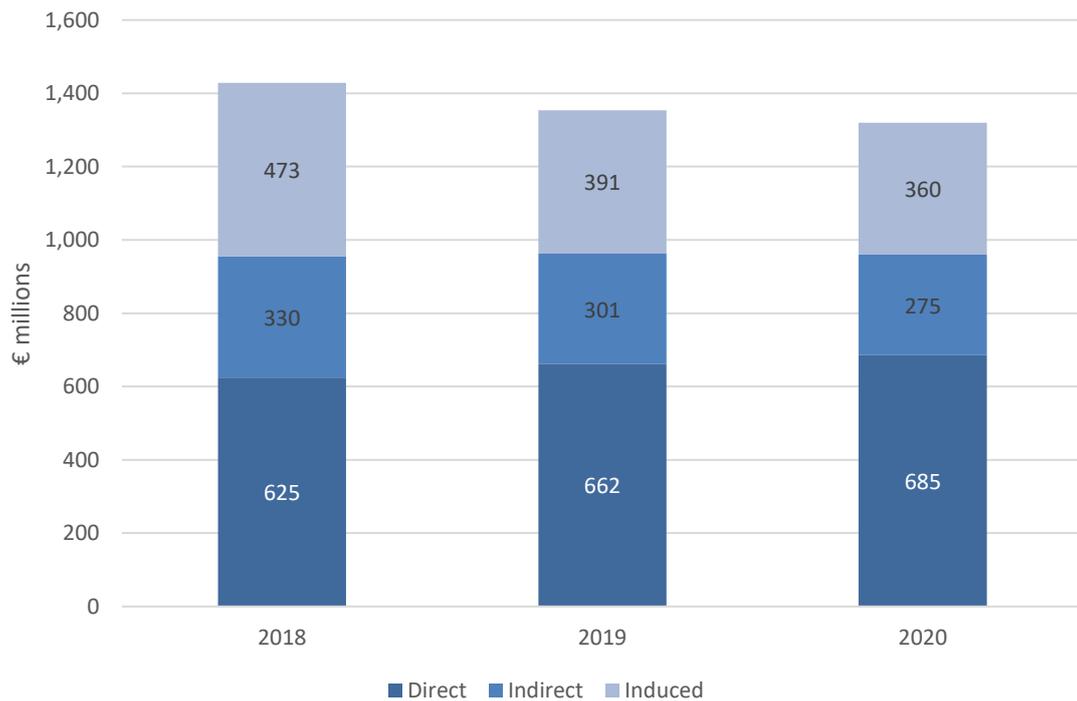
In 2020, the total impact of HEMEXPO companies on GDP amounted to €1.32 billion. In absolute terms, the total impact was 2.5% lower than in 2019. Since GDP declined, however, the total impact of HEMEXPO companies turned out to be 0.8% of GDP i.e. higher than in 2019 (Figure 3.1).

In particular, the direct impact on the Greek economy increased by 3.6% in 2020 which indicates high levels of resilience on the part of HEMEXPO companies, especially those operating in sectors other than Water Transport. The reduction of the total impact mainly resulted from the significant reduction of the indirect effect (-8,6% compared to 2019) and the induced effect (-8.0%). The latter is associated with the drastic change in the structure of household consumption (more imports because of the pandemic).

HEMEXPO businesses employ about 20 thousand people (Figure 3.2), with small changes on an annual basis. In 2019, the total impact on employment declined by 3.7% due to the reduction of investment expenditure (direct impact) and changes in household consumption habits (induced impact reduction by 4.4%). In contrast, the total impact on employment increased by 1.1% in 2020, mostly because of the increase in direct (2.9%) and induced impacts (2.6%).

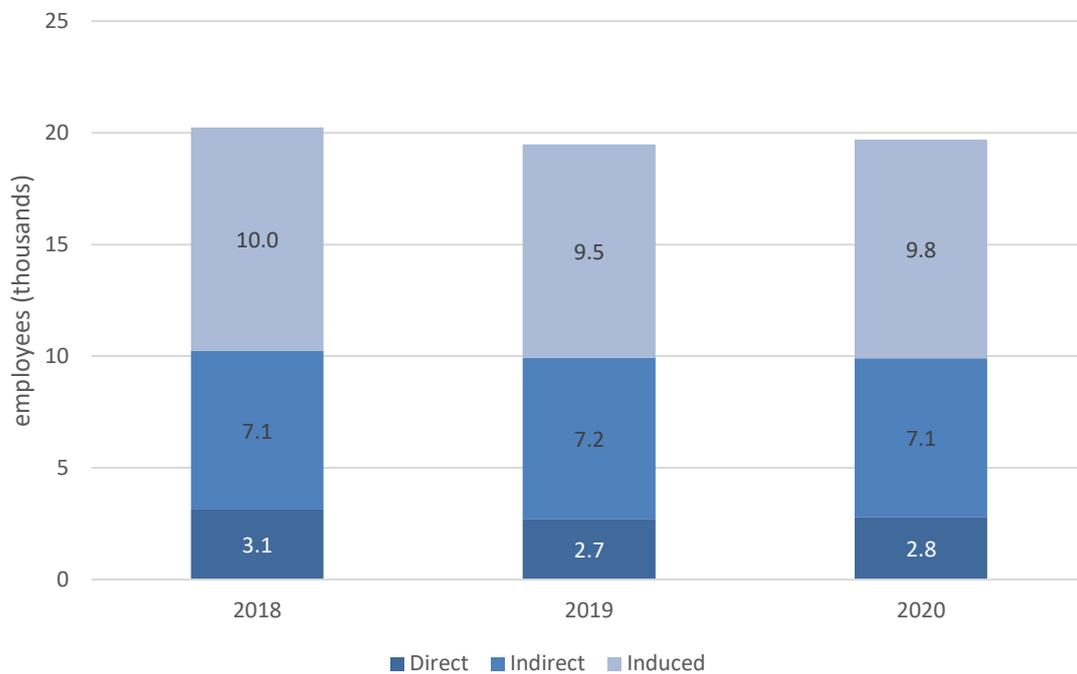
Regarding public revenue (Figure 3.3), the total contribution has decreased over time, from €283 million in 2018 to €226 million in 2020 from (-10.9% and -10.4% annual declines, respectively). The decline in total impact is mainly due to the reduction of the effect caused by changes related to household behavior (-14.4% in 2019, -9.1% in 2020) and a reduction in indirect effects (-3.6 % and -19.0% respectively).

Figure 3.1 Contribution to GDP, total HEMEXPO activity, 2018-2020



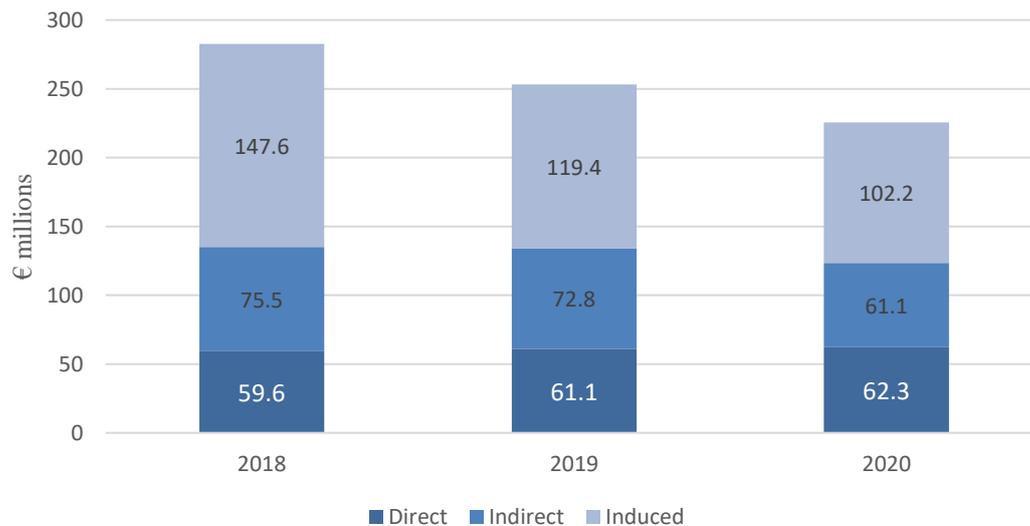
Sources: IOBE estimations based on HEMEXPO and ELSTAT data

Figure 3.2 Contribution to employment, total HEMEXPO activity, 2018-2020



Sources: IOBE estimations based on HEMEXPO and ELSTAT data

Figure 3.3 Contribution to public revenue, total HEMEXPO activity, 2018-2020



Sources: IOBE calculations based on HEMEXPO and ELSTAT data

3.4 Conclusions

If we factor in the interaction of sectors of the Greek economy, the contribution of HEMEXPO companies' sales in Water transport is multiplied and reaches (direct and indirect effect) €337 million in 2019; a 45.2% increase compared to 2018. During the first year of the pandemic (2020), sales in Water Transport declined by 11.2% and reached €300 million of domestic value added. The total contribution to employment amounted to 3.1 thousand jobs in 2019 and 3.2 thousand jobs in 2020, having increased by 4.2% in 2019 and 15.5% in 2020 compared to 2018, while the impact on government revenue increased by €47.5 million in 2019 (20.7% annual change) and €41.6 million in 2020 (-12.5% annual change).

If we look at total activity of HEMEXPO members, the total contribution to Greek GDP exceeded €1.35 billion in 2019, a 5.2% decline compared to 2018. The pandemic brought about a reduction of the total contribution to GDP (€1.32 billion in 2020). The contribution to employment is close to the levels of 2018, 19.4 thousand jobs in 2019 and 19.7 thousand in 2020. Finally, the contribution to public revenue amounted to €253.3 million in 2019 (10.4% decline compared to 2018) and €225.7 million in 2020 (-10.9% compared to 2019).

Table 3.1 Contribution to the Greek economy from Water Transport sales and from total HEMEXPO activity

Branches and variables / contributions	Direct	Indirect	Induced	Total	Multipliers
2019					
Shipping					
GDP	244	31	63	337	1,4
Employment	742	786	1.528	3.056	4,1
Public Revenue	21	7	19	48	2,3
Total activity					
GDP	662	301	391	1.354	2
Employment	2.722	7.215	9.549	19.486	7,2
Public revenue	61	73	119	253	4,1
2020					
Shipping					
GDP	217	25	58	300	1,4
Employment	792	811	1.582	3.184	4
Public Revenue	19	6	17	42	2,1
Total activity					
GDP	685	275	360	1320	1,9
Employment	2.801	7.102	9.794	19.697	7
Public revenue	62	61	102	226	3,6

4. HUMAN CAPITAL MANAGEMENT IN HEMEXPO: PROSPECTS AND CHALLENGES

4.1 Introduction

The purpose of this chapter is to highlight the prospects and challenges of human resources management in HEMEXPO's companies. This was based on the results of a questionnaire-based survey that took place in the second half of 2021 and examined the 2019-2020 period. 16 of HEMEXPO's 20 members participated in the survey, however, some answers provided were incomplete.

The questionnaire includes questions that capture various qualitative and quantitative characteristics of HEMEXPO's human capital, such as the number of employees, their gender, their professional and educational level, and broader employment trends over time.

Filling certain job vacancies, was identified as an important problem in a previous study conducted by IOBE. Therefore, this survey also aimed to recognize the characteristics of the labor market shortage, focusing both on the occupational characteristics of these vacancies and on the specific factors that hinder the recruitment of suitable employees. In addition, the questionnaire aimed to collect information related to skill availability and shortages. Another core element of the survey was to determine the quality of the professional training programs HEMEXPO offers. The survey also aimed to pinpoint the degree of collaboration between HEMEXPO companies and academic/research institutions. The last part of the survey concerned the current status and the prospects of Research and Development (R&D) in HEMEXPO firms.

In the following sections, we present the survey's findings, provide suggestions for further improvements in human capital management, and offer a set of strategic actions for attracting high-skilled employees.

4.2 Survey results

4.2.1 Employment data

The average number of employees per company participating in the survey was 37 in 2019-2020, most of whom were full-time workers.

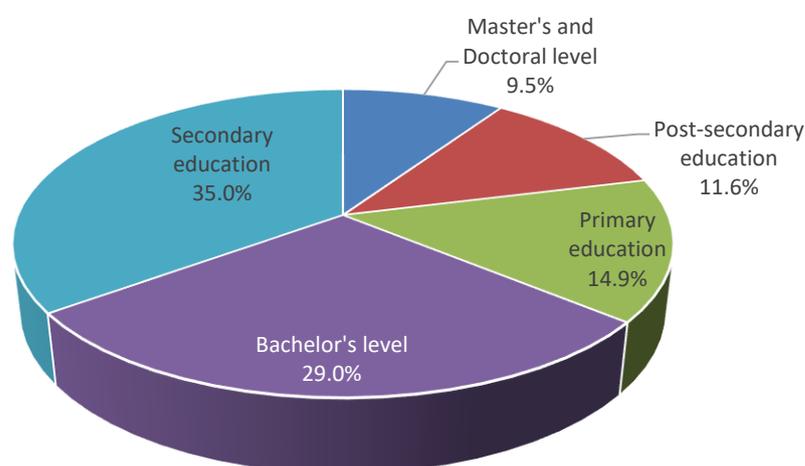
As noted in the second chapter of this study, employment increased in 2019 and 2020, due to the increase in demand for marine equipment, and also, possibly, due to the special labor support program "ΣΥΝΕΡΓΑΣΙΑ" (i.e. collaboration in Greek) which was implemented by the Greek government in order to mitigate the effect of the pandemic on the labor market. Employment will most likely continue to grow for 62.5% of HEMEXPO companies in the 2021-2023 period, as a result of positive economic sentiment and expectations.

In both 2019 and 2020, 7 out of 10 employees were men. Almost half of the employees in the 2019-2020 period had primary and secondary education (49.9%, Figure 4.1). 1 out of 10

employees has received vocational education⁵; most of them have obtained a specialized certification for technical professions related to maritime equipment manufacturing (indicatively mechanical engineering, automation technicians, thermo-hydraulics, electricians, etc.).

Moreover, 3 out of 10 employees in HEMEXPO companies hold a university degree and only 10% of employees hold a master's and/or doctoral degree; the percentage was slightly higher in 2020 (11% vs. 9% in 2019). The percentage of employees with master's and/or doctoral degrees is higher in companies with higher turnover. Employees with doctoral degrees in relevant fields (e.g. engineering, shipbuilding, etc.) can increase the efficiency of the production process and can contribute to better management of HEMEXPO companies, making them more competitive.

Figure 4.1: Educational level of employees in HEMEXPO companies

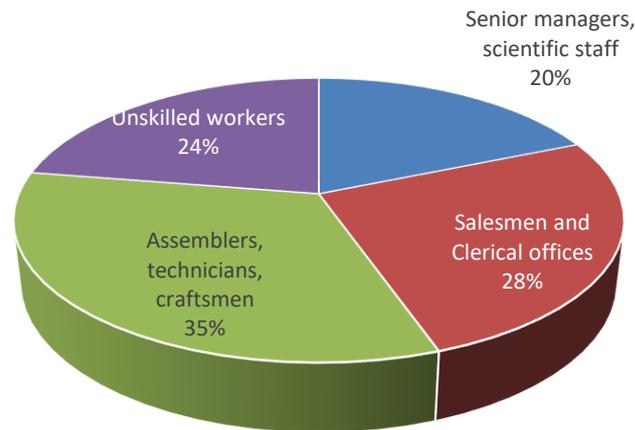


Source: IOBE

Most employees (59%) worked in positions related to manufacturing e.g. technicians, craftsmen, and unskilled workers (Figure 4. Figure 4.). Nearly 35% of the above are assemblers, technicians, and craftsmen, while 24% are unskilled workers. Another 28% of employees are salespeople and clerical officers, while 20% are managers and scientists. No changes in the composition of HEMEXPO's workforce were recorded during the study period.

⁵ This is a special category in the Greek educational system which includes several private and public educational structures that foresee different levels of vocational training.

Figure 4.2: Breakdown of employees in HEMEXPO companies by professional category

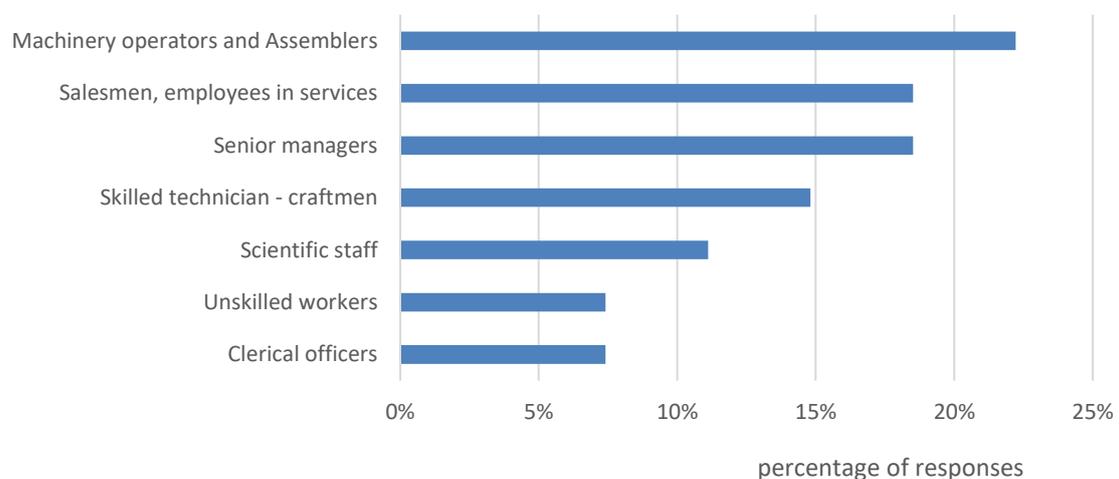


Source: IOBE

4.2.2 Filling employment vacancies

Almost half of the companies that participated in the survey (44.4%) faced problems in filling job vacancies. These vacancies were mostly related to the production line and equipment installation (Figure 4.3). A similar mismatch between labor supply and demand is noted in almost all EU Member States where marine equipment manufacturers have a significant presence (BALance Technology Consulting GmbH, 2017). In Greece, 22% of manufacturers identified difficulties in filling “Machinery Operator” vacancies, 18.5% of manufacturers reported having difficulties recruiting for the sales department, and 18.5% of manufacturers had difficulty hiring people in Senior Management (18.5%). 14.8% of companies reported difficulties in recruiting skilled technicians and 7.4% of enterprises had difficulties in filling vacancies for unskilled workers.

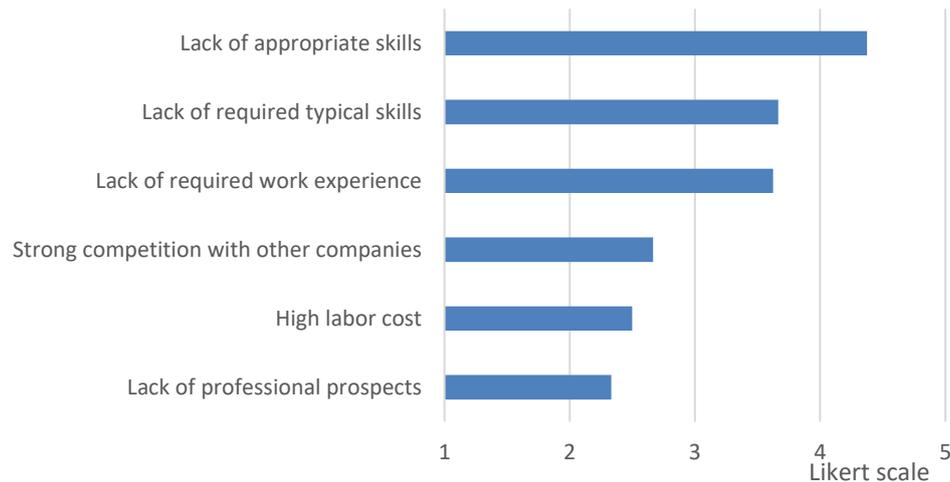
Figure 4.3: Labor shortage in specific professional categories of HEMEXPO



Source: IOBE

Lack of appropriate skills is recognized by almost all marine equipment manufacturers as a key obstacle in filling job vacancies, while half of them stated that the lack of required/typical qualifications, as well as work experience, are important obstacles, too (Figure 4.4Figure 4.). Only 1/3 of these companies stated that high employer costs constitutes an obstacle to filling vacancies.

Figure 4.4: Main obstacles for filling job vacancies

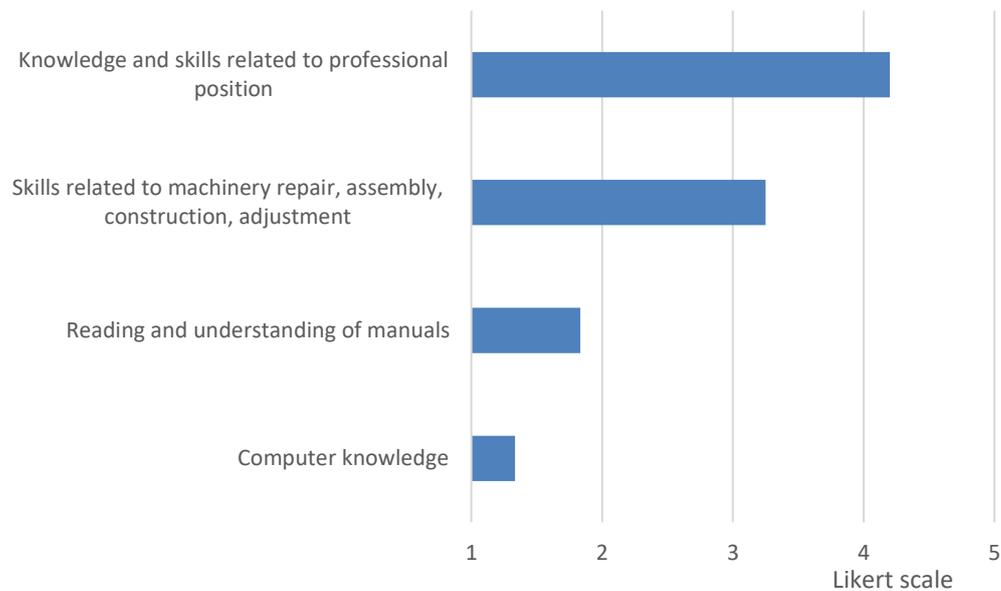


Source: IOBE

Note: Likert Scale 1 to 5, 1=Strongly disagree to 5=Strongly agree

It is important to identify those qualitative characteristics and skills that increase the labor market shortage. HEMEXPO's manufacturers claim that know-how deficiencies constitute the most important problem (scoring 4.2 on the five-point Likert scale), followed by assembly skills and manual dexterity (Figure 4.5). Deficiencies related to comprehension of technical manuals and computer skills are less pronounced (scoring 1.3 on the Likert scale).

Figure 4.5: Missing skills for filling job vacancies

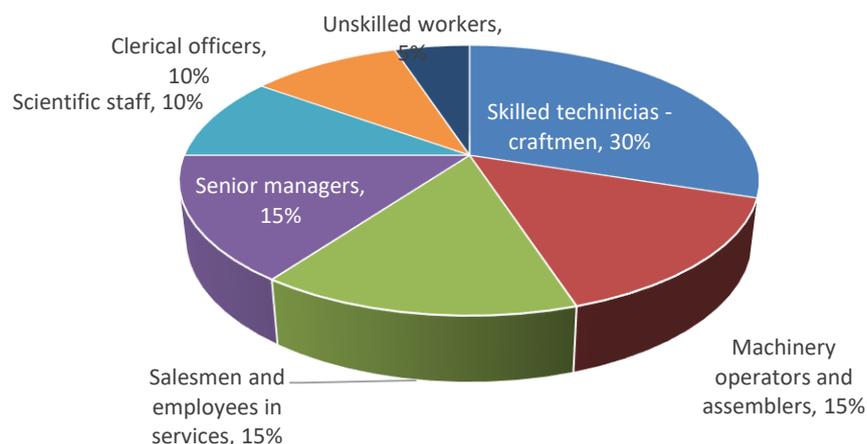


Source: IOBE

Note: Likert Scale (1 to 5), 1 = Strongly disagree to 5 = Strongly agree

Half of the companies that participated in the survey (50.0%) claim that their employees have significant shortages in terms of skills. Skilled Craftsmen - Technicians is the category with the biggest skill gap according to 30% of the companies (Figure 4). Further down the ranking, machinery operators and assemblers, employees in services departments, and Senior Managers appear to have significant skill gaps according to 15% of respondents.

Figure 4.6: Professional categories of employees in HEMEXPO companies with skill gaps



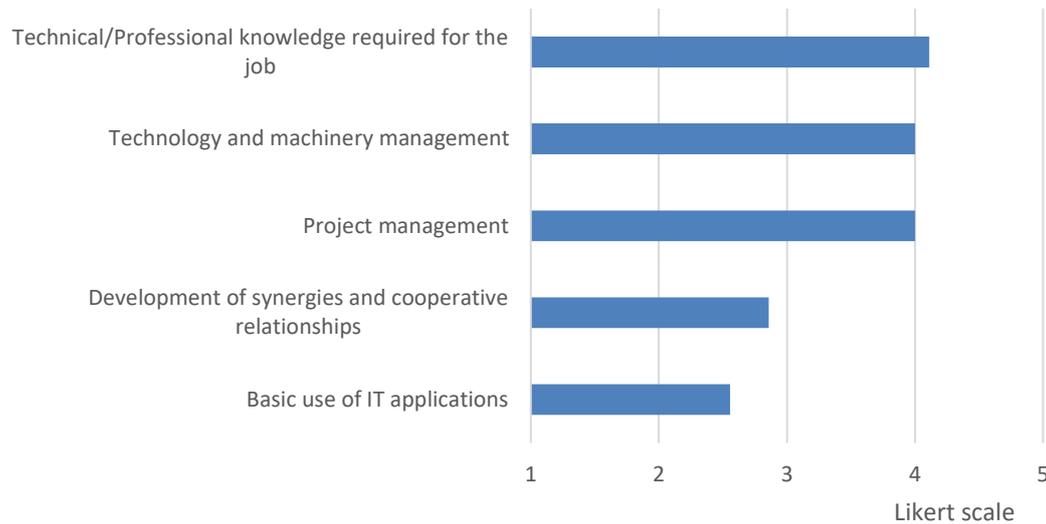
Source: IOBE

Note: * percentage of responses

Moreover, the companies stated that the skills missing from the professional categories ranked first in terms of shortages are largely related to technical and professional knowledge of specific tasks, technology and machinery management and project management (scored 4

on the Likert scale). The ability to develop synergies and partnerships seems to be also lacking for a significant number of employees. This skill is considered crucial for collaboration among the Water Transport and Greek-owned shipping sectors. Finally, use of IT applications is identified as another missing skill; however lower in the Likert scale.

Figure 4.7: Type of missing skills for the 1st ranked professional category in terms of missing skills



Source: IOBE

Note: Likert Scale 1 to 5, where 1= Strongly disagree to 5= Strongly agree

4.2.3 Human capital development

The need for continuous training has been already identified by the HEMEXPO companies. Currently, 75% of the HEMEXPO companies participate in some sort of training and skills improvement programs. 64% of the Greek industrial companies carry out retraining and/or skills enhancement programs for their employees. However, only 30% of the total workforce of HEMEXPO participates in such programs, while 91.7% of the training programs are financed by their own resources., Almost half of the marine equipment manufacturers of HEMEXPO, however, benefit from national and European funded training programs. Those training programs are implemented either in-house (e.g. e-learning, mentoring, coaching) or at the premises of external trainers and private consultants, in lifelong learning centers etc. In addition to the above, 41.7% of the HEMEXPO companies stated that they cover part or all tuition fees for the participation of their employees in Masters programs.

On the other hand, those manufacturers that do not participate in training programs indicated as key barriers the somewhat low specialization of the programs and the lack of time to effectively organize appropriate training events.

In that context, HEMEXPO has collaborated with experts of the Greek market for the design of specific programs/seminars aimed at addressing specific horizontal issues (see Box 4.1).

Box 4.1 HEMEXPO designed actions for bridging the skills gap

HEMEXPO designs and organizes several training programs on various topics to address challenges faced by its companies/members. Indicatively, in November 2019, a 20-hour training program on “Understanding Digital Transformation: Navigating the Waves of Disruptive Innovation” took place. This was attended by 18 members of HEMEXPO. The topics covered in the program were related to the use of modern technological solutions of digital transformation to address strategy and project management issues.

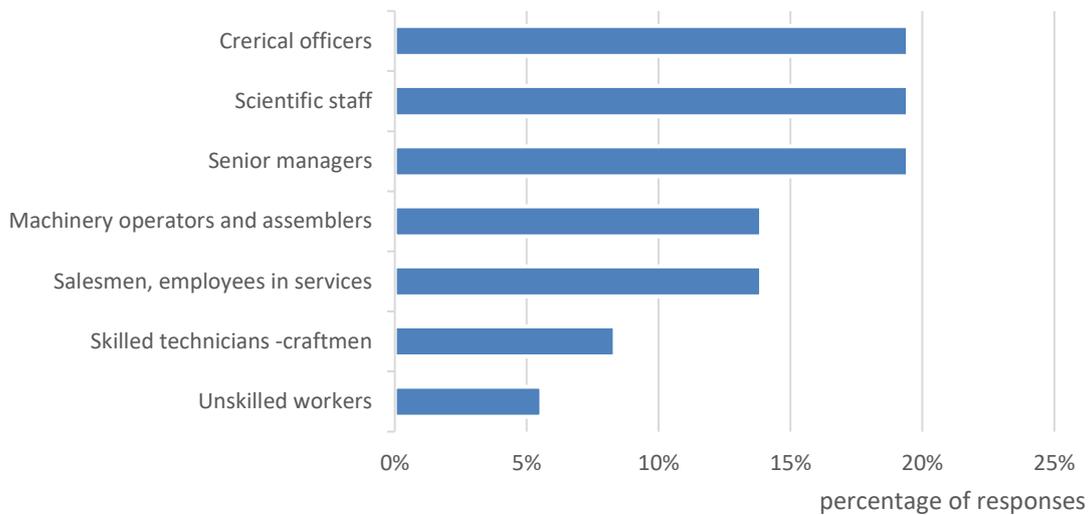
In addition, HEMEXPO's cooperation with the Alba Graduate Business School, which started in 2019, resulted in the design and implementation of an MBA program for HEMEXPO companies executives. The program ran in the 2020-2021 academic year and the first 25 HEMEXPO executives graduated in November 2021. The fees were covered entirely by HEMEXPO companies. At the time of the preparation of the present study, the HEMEXPO administration is under discussion with the ALBA Business school for the continuation of the program during the academic year 2022-2023.

The training programs/seminars in which HEMEXPO's companies have so far participated are mainly focused on general administration employees, scientific personnel, and senior managers (Figure 4.8). Only 13.8% of these programs were relevant to the machinery operators or employees in the Customer Services department. Finally, 8.3% of the programs concern Skilled Craftsmen, while only 5.5% concern Unskilled Workers. In general, it appears that those technical professions that exhibit the most notable skill shortages, are less addressed in the existing training programs/seminars.

The main objectives of the existing training programs/seminars are to improve productivity and to enhance the production process, according to 67% of the provided responses (Figure 4.9). Training on new technologies as well as skills development for new recruits are accomplished through the programs according to 50% and 33% of responses, respectively. Finally, only 16% of responses indicated that participation in the programs serves legal/regulatory obligations of the company.

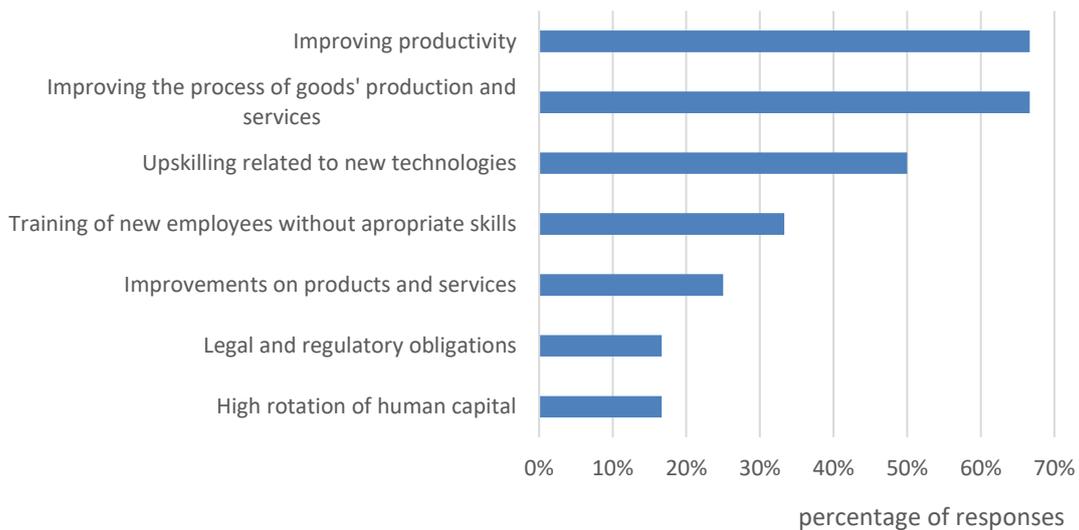
To maximize human capital efficiency and improve HEMEXPO's competitiveness in the domestic and global market, it is important to enhance the skills of employees across all professional categories. However, more attention is needed especially in these professional categories related to the production and research and development lines, since these are the professions with the largest skill gaps .

Figure 4.8 Relevance of the training programs/seminars by professional category of HEMEXPO's personnel



Source: IOBE

Figure 4.9 Objectives of the training programs/seminars



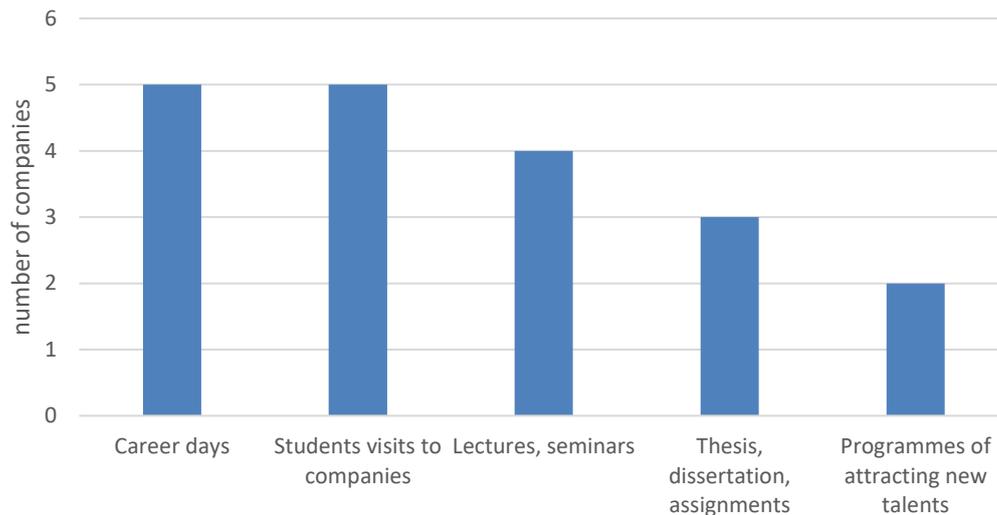
Source: IOBE

4.2.4 Collaboration with educational institutions and R&D

When reviewing the questions related to the development of partnerships between HEMEXPO companies and Greek educational institutions, three out of five companies stated that some synergies exist and are materialized through the provision of apprenticeship and/or internship positions. The internship positions offered are mainly for university students and secondarily for students of OAED (i.e. one of the Greek post-secondary education system), while the apprenticeship positions for students of public and private institutions is limited. The limited provision of apprenticeships is hindering the attractiveness of the corresponding professional categories. Therefore, this affects the gap between labor supply and demand which, as mentioned in previous sections, remains significant.

In addition, almost 57% of companies reported that they have already entered into some form of collaboration with university, providing information regarding HEMEXPO's activities and the career opportunities offered. These actions mainly involve participation of HEMEXPO professionals in career days, hosting student visits to HEMEXPO companies, as well as speeches and lectures to students (Figure 4.). Fewer companies accepted senior students conducting their theses in 2019-2020 or participated in programs to attract young talents.

Figure 4.10: Collaboration activities between HEMEXPO and the Greek Universities



Source: IOBE

Nearly 70% of the companies stated that they have developed an inhouse Research and Development department, which employs about 10% of their employees. As expected, human capital in R&D departments is mainly composed of employees with postgraduate and doctoral degrees. Indicatively, these employees constitute approximately 1.15% of all staff employed in R&D related professions in Greece⁶. Finally, half of HEMEXPO companies that participated in the survey stated that they would be willing to outsource part of their R&D to a Greek academic institution.

4.3 Conclusions and proposed actions

HEMEXPO companies, and marine equipment manufacturers in general, operate in a wide range of manufacturing, trade and service sectors. Indicatively, HEMEXPO's activities include the production of specialized mechanical equipment, installation and maintenance services on ships as well as specialized services related to the construction, conversion, and maintenance of ships and maritime structures. The variety and strong diversification of the activities of HEMEXPO companies create a great need for qualified employees. The nature of the industry's activities requires highly skilled staff in production, research and development, and customer service departments.

⁶ Eurostat

The results of the survey conducted for the 2019-2020 period, confirm the gap between labor supply and demand identified by IOBE in its previous study. HEMEXPO companies face difficulties in filling open job positions, mainly due to the lack of appropriate skills, required work experience, and formal qualifications. Significant skill gaps of both candidate and existing staff are identified, mainly among technicians, machinery operators and, more generally, in professions related to the production departments. This gap slows down the general development of human capital of HEMEXPO, limiting the cluster's competitiveness in the Greek and global market. In an effort to cover the above, approximately 40% of employees participate in professional training programs, which are mainly funded by HEMEXPO's own financial resources. The trained staff belongs mainly to the scientific, managerial/administrative categories. By contrast, technical staff, the professional category with the largest skills gap, is less involved in training programs.

An important finding of the study related to both the supply/demand and skills gap is that the number of companies that collaborate with Greek educational institutions is relatively low. This limits information diffusion regarding activities of marine equipment manufacturing sectors to students and does not enhance networking between companies and students that could serve as the starting point for future partnerships. In addition, more effective cooperation with academic institutions can further support the research and development departments of the HEMEXPO cluster.

Taking into account the findings of the survey, the next section presents a set of proposed actions that can support the development of the clusters human capital in the future.

Suggestions for enhancing the qualitative characteristics of HEMEXPO's human capital

Reducing the labor market shortage

One of the key issues that needs to be effectively addressed by HEMEXPO companies is the reduction of the gap between labor supply and demand.

First of all, it is necessary to identify those Greek educational institutions (secondary, post-secondary, tertiary education) that could potentially supply junior professionals the HEMEXPO firms.

The next step is the enhancement of cooperation of marine equipment manufacturers with the educational institutions to design curricula that could lead to specialized junior professionals that could, in turn, be employed in HEMEXPO companies. This, in addition to enhancing the quality of potential human capital of marine equipment manufacturers, will improve the efficiency of the educational process itself, as graduates from the relevant schools will be professionally absorbed in their field of study.

This cooperation will have other, complementary benefits. The quality of the workforce, and working conditions in general, are improved and upgraded when workers obtain specialized knowledge and high quality skills. In this context, the sustainability of the profession is

enhanced and the use of the worker's own knowledge enhances the competitiveness of the average HEMEXPO company itself.

At the same time, through the implementation of other activities, HEMEXPO can improve dissemination among students regarding potential career opportunities. Moreover, the provision of internships and apprenticeships will allow graduates of the relevant institutions to increase their awareness of collaboration prospects with HEMEXPO's companies.

The design and implementation of an internship program in collaboration with universities and schools can benefit the attractiveness of professions and specialties in HEMEXPO companies. However, since it is noted that several interns and young professionals abandon their position before the end of the internship period, the use of financial incentives is suggested.

The collaboration of HEMEXPO companies with schools/universities can include a range of other activities. Indicatively:

- Increased number of student visits to HEMEXPO companies, to provide information related to the scope and objectives of work. Thus, students will be able to see the facilities and production lines and identify tasks that might be interesting.
- Lectures and seminars to students from HEMEXPO's professionals. In this way, students will be informed about the current technical issues that marine equipment manufacturing is facing.
- Preparation of a thesis in cooperation with a HEMEXPO member. This is already being implemented in several European academic institutions. Students choose a topic that is relevant to their studies but is also of interest to a relevant industry. During the course of the project, a specific company provides data, information and often a desk to the students. In this way, students research a practical issue of significant value-added for the companies while collaborative relationships between students and companies are cultivated, which often result in long-term cooperation after the end of the studies.

Improving the skills of employees in HEMEXPO companies

The exploitation of human capital of HEMEXPO's companies requires high levels of specialization and the ability to adapt to the ongoing changes required by the global market. The skills gap in both future and existing employees is hindering the long-term growth of HEMEXPO companies.

The aforementioned strengthening of the interconnection of HEMEXPO's companies with the educational and academic institutions will also be beneficial for improving the skills of HEMEXPO's employees. In particular, it will contribute to the provision of up-to-date scientific knowledge from the university to the employees, improving the competitiveness of human

capital in terms of know-how. This, in turn, will contribute significantly to the development and production of improved, innovative products and upgraded services.

Participation in state-provided professional training programs is still limited and is not focused on those professional categories with the biggest skill gap. Therefore, the need for increasing the number of employees participating in training programs is imperative, however, the scope of the programs should be expanded to include other professional categories, especially those related to production processes (craftsmen, technicians, machinery operators, unskilled workers)

In addition, the seminars and training programs designed by HEMEXPO play an important role in the training and the upskilling process, and should therefore be continued. Prior to this, an integrated plan to target those skills as well as the specific professional training category should be implemented, in collaboration with HEMEXPO's members. In this context, the following are proposed:

- Training programs in cutting-edge technologies for unskilled workers/machinery operators and related technicians.
- Employee retraining programs in selected professional positions according to the needs of the companies, with evaluation and human capital development procedures.
- Training and reskilling of human capital in innovative technologies. The renewal of cooperation with academic institutions to provide postgraduate training programs for both scientific and administrative staff can support the implementation of targeted retraining processes in a relatively short period of time.

