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Just transition career planning for seafarers: challenges and opportunities for sustainable shipping

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JUST TRANSITION CAREER PLANNING FOR SEAFARERS: CHALLENGES AND OPPORTUNITIES FOR SUSTAINABLE SHIPPING

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Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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(Date): 25th September, 2023

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Abstract

Title of Dissertation: **Just transition career planning for seafarers: challenges and opportunities for sustainable shipping**

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The maritime industry is undergoing changes driven by geopolitical trends, technological developments, as well as with the desire to fully decarbonize the maritime industry. Achieving the UN Sustainable Development Goals is impossible without sustainable maritime transport. Seafarers and onshore maritime professionals are at the centre of these processes, but unfortunately, the role of seafarers still remains insufficiently appreciated and visible. Seafarers require special protection and a just transition throughout their career. Unfair treatment of seafarers could increase existing shortages of seafarers and skilled onshore maritime personnel, and could leave the maritime industry unable to compete with other industries in attracting and retaining the most talented young men and women. All seafarers, regardless of their gender, nationality or country of residence, must be guaranteed early access to maritime education, training and skills, and must be guaranteed a fair transition to work in the maritime industry on board and onshore.

The purpose of this study is to examine the structure of the international maritime labour market for seafarers and shore-based maritime personnel, identifying factors, challenges and opportunities that may influence employment in the maritime industry. An important part of the research is to explore the perspective of seafarers regarding their motivation for professional development, skills and support their needs, as well as assessing the ability of the maritime industry to meet the needs of seafarers to ensure just transitions in career planning.

KEYWORDS: Seafarers, Career Pathway, Sustainability, Maritime Policy, Skills, Just Transition

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List of Abbreviations

ACM	Artificial Chief Mechanic
AI	Artificial intelligence
AR	Augmented Reality
BIMCO	Baltic and International Maritime Council
COVID-19	Coronavirus Disease 2019
ECSA	European Community Shipowners' Association
EMSA	European Maritime Safety Agency
ESG	Environmental, Social and Governance
EU	European Union
GDP	Gross Domestic Product
GNGs	Greenhouse gases
ICS	International Chamber of Shipping
IMO	International Maritime Organization
ILO	International Labour Organization
IoT	Internet-of-Things
ITF	International Transport Workers' Federation
MET	Maritime Education and Training
ML	Machine Learning
MLC	Maritime Labour Convention 2006, as amended
MPA	Maritime and Port Authority of Singapore
OECD	Organisation for Economic Co-operation and Development
SCC	Shore Control Centre
SDG's	United Nations Sustainable Development Goals

STCW	The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
VR	Virtual Reality
WMU	World Maritime University

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Chapter 1. Introduction

1.1. Background and rationale

The maritime industry is essential for international and regional trade, development and transports more than 80 percent of world trade (by volume) (UN, 2020). Shipping is a unique industry of interconnected sectors, including ship design, shipbuilding and ship repair, ship owning and management, shipping finance, ports and other sectors. For many states, this industry plays a crucial role in ensuring national security, foreign trade, economics, food and environmental security and sustainability, and also generates a large number of jobs both within the industry and in related sectors of the economy.

The maritime industry is undergoing significant changes driven by geopolitical trends, structural changes in international trade, new technologies to ensure decarbonization, digitalization, resilience and sustainability (UNCTAD, 2022). Antonio Guterres, the United Nations Secretary-General, in his address to the UN General Assembly stressed that new technologies could disrupt many labour markets. Some traditional professions may disappear completely, while the nature of others may change significantly (World Maritime University, 2019).

The World Maritime University conducted a study entitled "Transport 2040 – The Future of Work" for the International Transport Workers Federation (ITF). Phase I of the Research (WMU, 2019) was devoted to an overall assessment of the impact of automation and technology on employment in various transport sectors (aviation, road transport, railway, maritime and inland waterway transport). In this phase, research was carried out to forecast the development of technology, forecast the development of transport and world trade, as well as assess the human resources of the transport industry. The study found that despite the introduction of new technologies in transport processes, increasing digitalization and automation of transport, qualified transport workers will be necessary in the foreseeable future. At the same time, the set of knowledge and skills required by transport workers may change significantly. The researchers also examined country profiles to assess opportunities for introducing new

technologies. Among other things, the study found that the path to widespread use of new automation technologies in transport will largely depend on the level of technological development of different countries and regions. Researchers have also noted a significant gap in technological development between developed and developing countries.

Phase II of the Project "Transport 2040 – The Future of Work" is devoted to assessing the impact of technology on seafarers (Ölçer et al., 2023). The study found that future seafarers will need to possess a new set of knowledge, skills and competencies. The role of soft skills, ability to work with new technological solutions, flexibility, willingness to solve problems and other creative and management skills will increase significantly. In order for seafarers to obtain new knowledge, training and competencies, the system of education and training of seafarers must be significantly changed (ITF, 2023; Ölçer et al., 2023). The study found that seafarers should be provided with clear career paths, as well as the necessary assistance in professional development.

Phase II of the Project also analyses countries' maritime profiles more specifically (Lagdami & Bellini, 2023). The researchers assessed the maritime profiles of countries according to the following criteria: the level of technological development and readiness to introduce innovations of the country; labour market and human capital; economics and business; social acceptance; regulation and management. The study found that despite a number of positive factors, countries have different degrees of readiness to introduce new technologies, especially in developed and developing countries. Given the global nature of international maritime shipping, varying degrees of countries' readiness to implement new technologies may have a negative impact on the sustainability of the shipping industry (Lagdami & Bellini, 2023).

External factors and global trends that influence the country maritime profile of the and, in particular, the employment of seafarers and onshore maritime personnel require more detailed study. Economic impact identifies five categories that require assessment: geopolitical trends and macroeconomics, social factors, environment,

technology and the distribution and availability of natural resources (Noronha et al., 2023).

The international maritime labour market both for seafarers and onshore maritime personnel is extremely competitive due to the nature of the global maritime industry. States, shipowners and other maritime stakeholders constantly compete for access to limited resources, in particular for access to qualified maritime specialists (Clayton, 2022). The international labour market for seafarers is already characterised by an acute shortage of qualified seafarers (ICS, 2021). Regarding maritime personnel onshore, Kitada et al., (2023) after interviewing shipping companies found that the majority of companies (54.4%) expect difficulties in finding and attracting competent and qualified employees for their future activities. Moreover, the international maritime labour market is characterised by high labour mobility both among seafarers and among maritime personnel onshore (Ma, 2020). The gap established by the WMU research between developed and developing countries in the level of technological readiness, different access to modern education, knowledge and different social standards can further increase the level of labour migration in the maritime industry and significantly increase the gap between different countries and regions.

Understanding the current and future demand in the maritime labour market is essential for policymakers to ensure sustainable development of international shipping, as well as for the development of nationals and regional maritime clusters. States that timely determine their future needs for qualified maritime personnel, as well as creating the best conditions for attracting and retaining the most talented young men and women in the maritime industry, will receive competitive advantages in the international maritime labour market.

1.2. Problem statement

Seafarers and maritime professionals onshore are particularly vulnerable to the changes currently taking place in the maritime industry. The transformation period should be fair and maritime professionals must have clear career paths and be motivated for career development and lifelong learning to meet the growing demands

of the global maritime industry. Moreover, the uneven development of maritime technologies in different regions, the significant concentration of the maritime industry in large international maritime centres of ship financing and ship management may lead to increased labour mobility of the most talented professionals, which will widen the gap between developed and developing countries.

The study aims to to examine the structure of the international maritime labour market for seafarers and shore-based maritime personnel, identifying factors, challenges and opportunities that may influence employment in the maritime industry, as well as to explore career challenges and opportunities for seafarers to ensure just transition from seafaring to onshore work, as well as to explore the ability of the maritime industry to meet the basic needs for clear career planning.

1.3. Objectives and research questions

The objectives of this research are the following:

- Identify the composition of the international maritime labour market for seafarers and onshore maritime personnel, as well as factors that may influence the employment in the maritime industry;
- Determine current and future challenges for the maritime industry that may have an impact on the composition of the international maritime labour market and career planning in the maritime industry;
- Explore the needs of seafarers for career planning and professional development while working on vessels and for just transitioning to work in the maritime sector ashore.

In order to achieve the above objectives, this research strives to answer the following questions:

1) What are the main factors that determine the composition of the international maritime labour market?

2) How career paths and the composition of the international labour market may change in response to challenges in the maritime industry?

3) What needs do seafarers have to ensure just transition career planning and is the maritime industry capable of meeting them?

1.4. Scope and Delimitation of the research

For the purposes of this dissertation, the term "seafarer" means persons certified under the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, as amended. During the research of the international labour market for onshore maritime professionals, preference was given to analysing the opportunities and risks of employment in the sectors, for which the seafarer's profession is the basis for professional growth and development.

This dissertation does not address the characteristics, conditions of employment and career pathways in the port sector, shipbuilding, ship repair, fishing and ship scrapping. Employment in these industries is predominantly characterised by the use of domestic workers and does not require experience as a seafarer.

1.5. Research methodology and ethics

The following methodologies were used to conduct the research:

- systematic literature review of scientific publications on the problem of recruitment of seafarers and onshore maritime personnel;
- quantitative analysis of data from sectoral statistical reports in the field of maritime economics, shipping statistics, maritime education and training, research data on the impact of new technologies on the employment and career development of seafarers and ashore maritime personnel.
- quantitative method – 217 seafarers representing 21 nationalities were surveyed using an online questionnaire.

The approval of the WMU Research Ethics Committee was obtained before the collection of data. The survey was conducted in accordance with the WMU Research Ethics Committee rules and guidelines regarding human involvement in data collection. Particular attention was made to obtaining informed consent from respondents before participating in the survey, as well as maintaining strict

confidentiality and anonymity of responses received from seafarers. Collected data were securely stored using password protection and were securely deleted after completion of the study.

1.6. Dissertation structure

This dissertation is composed of 5 chapters.

Chapter 1 presents the background for the significance of the problem. The chapter also contextualises the work with the purpose and objectives of the study and brief discussion of the limitations of the research.

Chapter 2 contains a description of the maritime industry as employment generator, as well as the composition of the international maritime labour market for seafarers and the maritime labour market for onshore maritime professionals.

Chapter 3 describes current and future challenges that may impact the international maritime labour market, and describes the educational and skill requirements needed by maritime professionals for a successful career pathway.

Chapter 4 describes the results of surveying seafarers.

Chapter 5 contains the main conclusions, recommendations, and scope for future research.

Chapter 2. Composition of the international maritime labour market

2.1. Introduction

This Chapter presents the global maritime industry as an employment generator, describing employment in the shipping sectors for which the seafaring profession is the basis for a career path. The Chapter describes the international maritime labour market for seafarers and the international maritime labour market for onshore maritime professionals, identifying the factors influencing the composition of the global maritime employment market

2.2. Maritime industry as an employment generator

The maritime industry is a complex globalised sector of the world economy with unique characteristics and various stakeholders, special regulatory system, engineering, financial, insurance relationships, as well as special employment conditions. The industry is also the driving force behind the globalised world economy, and ensures the stability of international supply chains for essential goods, including medicines and medical equipment, fuel and food. Seaborne trade volume in 2021 was approximately 11 billion tons, valued at more than $14 trillion. (UNCTAD, 2022). Only the container shipping sector alone is projected to reach $12.52 billion by 2028 (Shipfinex, 2023).

The maritime industry consists of a large number of different interrelated sectors: ship design and engineering, shipbuilding and ship repair, the port sector, fisheries, shipping finance, marine insurance, maritime law, maritime educational academies, maritime training providers, maritime research and design centres, maritime consulting, maritime supply, specialised intergovernmental, governmental and non-governmental organisation and other sectors. Shipping, being just one of the sectors of the global maritime industry, itself has various sectors such as container shipping, bulk cargo shipping, tankers, offshore industry, cruise shipping, fisheries and

others. Together, all sectors of the maritime industry are a powerful generator of jobs both offshore and onshore.

The maritime industry generates a large number of workplaces for many states. For example, in Singapore, the maritime industry has more than 5,000 businesses employing more than 160,000 people in all sectors of shipping (Ministry of Transport of Singapore, n.d.). According to the European Community Shipowners' Associations (ECSA), more than 640,000 seafarers and maritime professionals work directly ashore in the maritime industry in the European Union. Together with related industries, the maritime industry collectively creates more than 1.4 million jobs. (ECSA, 2019).

The international maritime labour market can be divided into two interrelated sectors: the seafarers' sector and the onshore shipping-related employment sector (finance, insurance and P&I, shipping management, chartering and others). Maritime employment, like the maritime industry as a whole, is extremely globalised and has its own unique features. Selkou and Roe (2022) point out that the main and most valuable assets of the shipping industry are ships. These assets do not have a fixed location on land and, therefore, represent a special form of assets that by their nature contribute to a deeper globalisation of the shipping industry compared to other industries. Maintenance of these assets requires the involvement of qualified specialists to work on ships and onshore.

The maritime labour market is characterised by a high degree of international labour mobility, where maritime professionals can move freely from one country to another, along with their knowledge, skills and experience (Ma, 2020). For instance, open registries, which together handle almost 75% of the world's tonnage (deadweight), do not impose any restrictions on the nationality of seafarers. Some shipping companies, in order to reduce their administrative and overhead costs, outsource part of their management and administrative functions to foreign ship management companies, mainly in Malaysia or Singapore (Ma, 2020).

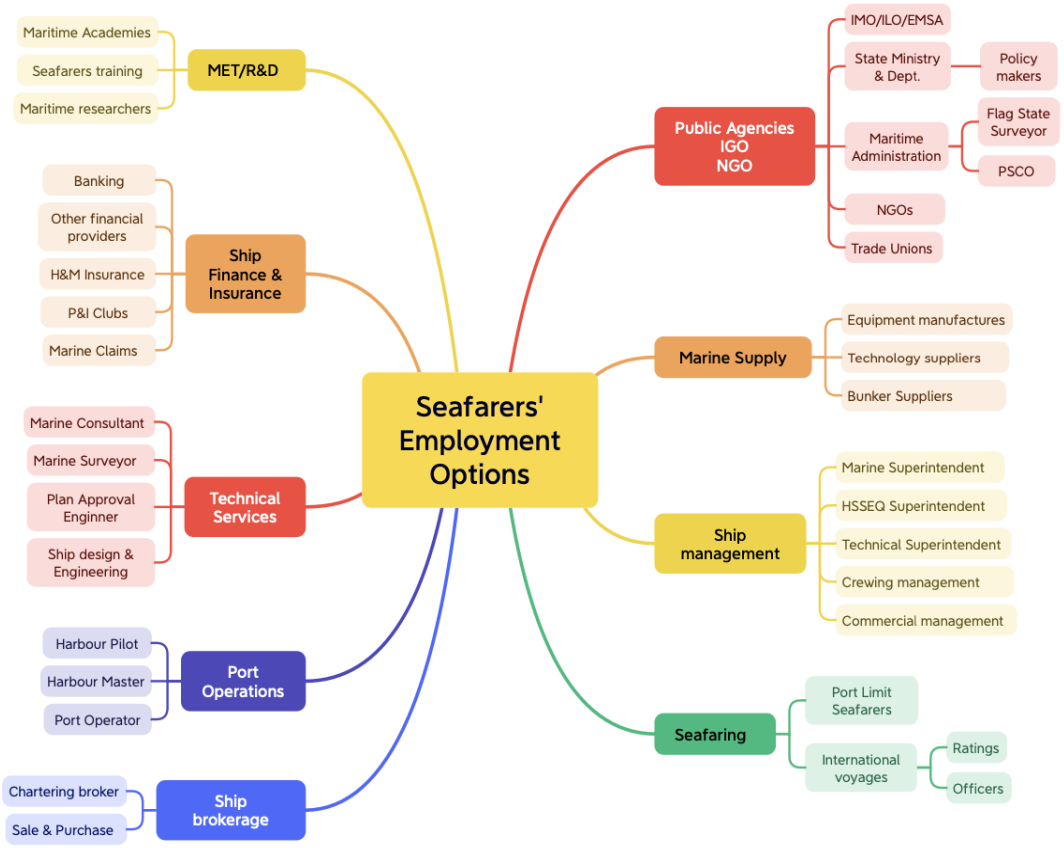
It is generally recognized that the experience as a seafarer is essential for successful work in the onshore sector (Selkou & Roe, 2022; Kitada et al., 2023). Employment as a rating seafarer on a merchant ship requires a relatively low level of

a basic education and training. The basic work tasks of seafarers require essentially standardised knowledge and skills, as clearly identified in the International Convention on Training, Certification and Watchkeeping of Seafarers, 1978 (STCW, 1978), as amended. Such knowledge and skills are relatively easy to acquire. For a career advancement as a ship master or engineer, it is necessary to have special maritime education, skills and seagoing experience. Ma (2020) noted that "*for a country with a limited maritime industrial base to participate in maritime transport, seafaring may be the suitable sector of entry"*. At the same time, seafaring is the sector with the lowest multiplication effect for the development of other maritime sectors.

The knowledge and skills required of onshore personnel are a more complex set of competencies, including analytical skills, problem solving (Ma, 2020), commercial skills (business negotiation, business opportunities development, chartering, market research, networking, solution design thinking) and digitalisation skills (business data analysis, cyber security, data mining and modelling, technology integration) (Maritime and Port Authorities, n.d.).

Figure 1

Seafarers' Ship-to-Shore Employment Options



Source: Author's creation.

2.3. Seafarers' labour market

Seafarers are central to the safe and efficient operation of the global maritime transportation system. In 2021 around the world there were 1 892 720 seafarers, of whom 857 540 were officers and 1 035 180 were ratings–skilled seafarers who carry out support work for officers (ICS/BIMCO, 2021). Due to the global nature of shipping, 65 IMO Member States, as well as two IMO Associate Members, have recognized seafarers as key workers (IMO, 2022).

Geographical distribution. The Philippines is the largest supplier for both officers and ratings followed by the Russian Federation, Indonesia, Republic of China,

and Republic of India. Together, these countries supplied 44 percent of the global seafarer workforce (ICS/BIMCO, 2021). Manning Annual Review and Forecast 2023/2024, prepared by Drewry, one of the most reputable marine research and consulting companies, provides almost the same data. The Philippines, China and India continue to dominate the international seafarer labour market. India and the Philippines also have high population growth rates. Chinese seafarers are predominantly employed in the domestic labour market.

The largest growth in the supply of seafarers is observed from India, Latvia and Russia (Drewry, 2023). The significant increase in the number of Indian seafarers is due to the notable, growing demographic composition of the country's young population. The relatively low salary expectations of Latvian and Russian seafarers compared to European seafarers have become the main reason for increasing the employment of seafarers of these nationalities. Ukraine lost about 19% of the total number of seafarers working in world merchant shipping during the last decade. This happened due to a series of successive crises caused by the war between Russia and Ukraine, and earlier with the global COVID-19 pandemic (Drewry, 2023).

The supply of Russian seafarers in 2022-2023 decreased by 10% (Drewry, 2023). The future supply of Russian seafarers is difficult to predict. Some Russian seafarers are trying to migrate to neighbouring European countries, not wanting to return to Russia because of the threat of mobilisation into the armed forces. At the same time, the Russian authorities may impose restrictions on the departure of men subject to mobilisation, including seafarers. Shipowners also face significant difficulties in hiring Russian seafarers, from the difficulty of paying wages due to sanctions against Russian banks and to the problem of forming multinational crews, which may include Russian and Ukrainian seafarers.

Ukraine, Myanmar, the Philippines, Republic of India, Republic of China, Romania, Greece, Indonesia, Croatia and the United Kingdom are the most likely future seafarer supply countries as indicated by shipping companies (ICS/BIMCO, 2021). Among the main reasons for the possible transition of shipowners to the new maritime labour market are the level of English proficiency of seafarers, the

availability of seafarers, visa restrictions, as well as changes in the trading area of ships (UNCTAD, 2022). However, Kitada et al (2023) point out that the supply of the maritime labour market in the future may be significantly affected by the growth forecast of the world's population. According to the World Population Prospect notes by 2040 the highest concentration of population in the under-25 age group will be in Africa (53.8%), followed by Oceania (35.0%), Asia (32.6%), Latin America and Caribbean (32.3%), North America (28.4%), Europe (24.8%) (UN, 2022; Noronha et al., 2023).

Distribution by the shipping sectors. The largest number of STCW-certified officers work on general cargo ships (26%), bulk carriers (19%) and offshore vessels (13%). Similar figures are noted for the labour market of rating seafarers, where these ratios are 27% for general cargo ships, 21% for bulk carriers and 10% for offshore vessels (UNCTAD, 2022). Drewry notes an increase in demand for seafarers in the LNG and dry bulk sectors, which is associated with an increase in the number of vessels of these types (Drewry, 2023). Similar data are given in the International Chamber of Shipping (ICS) and Baltic and International Maritime Council (BIMCO) joint forecast for the development of the world merchant fleet until 2026. The largest number of additional officers will be needed for the LNG sector (6,1%), bulk cargo sector (3,5%), LPG (2,4%), oil tankers (1,7%), chemicals (1,6%), containers (0,8%) and other (-0,2%) (ICS/BIMCO, 2021). This forecast is especially important given that the LNG ship sector attracts the most experienced and qualified seafarers. At the same time, the increase in employment in the sector of dry cargo ships has a significant impact on the overall demand of seafarers. These circumstances, taken together with the Ukrainian-Russian crisis, the still felt effects of the global COVID-19 pandemic and the desire of seafarers to reduce the duration of their contracts, are putting significant pressure on the international seafarer's labour market.

Age distribution. According to the ICS/BIMCO Workforce report 2022, the largest number of seafarers – officers at command level (37.4%) are in the 41-50 age group, followed by the 31-40 age group (30.3%), and then the age group from 51 to 60 years - 21.7%. At the operational level, the largest age group of officers aged 31-

40 is 41.1%, and the second largest group is aged 21 to 30 – 35.1% (ICS/BIMCO, 2021). Ageing seafarers may face significant challenges in acquiring the new knowledge and skills required by new technologies for digitalization and automation of ship management and control systems, which can have a significant impact on their degree of motivation to continue as seafarers. This could result in a significant exit of older seafarers from the pool of available seafarers, especially among Europeans. Significant recognition of these seafarers by young, ambitious seafarers with the necessary knowledge and skills to work on modern seagoing vessels will be required.

Kitada et al (2023) noted that the global population under the age of 25 will decline slightly. The largest concentration of the population under the age of 25 will be observed in African countries (53.8%), Oceania (35.0%), Asia (32.6%), as well as in Latin America and the Caribbean (32.2%). For North America and Europe, these figures will be only 28.4% and 24.8%, respectively. This situation may make the African continent the most attractive future markets for seafarers, but requires significant investment to provide basic maritime education on the continent (Noronha et al., 2023).

Shortage of seafarers. Shipping continues to grow rapidly. The global active merchant fleet in 2021 consisted of 74,505 vessels, up 8.4% from the 68,723 active vessels estimated in the 2015 report. The number of tankers and bulk carriers for crude oil increased by 19% (from 2506 to 2976) and 14% (from 10963 to 12474). The number of vessels for the carriage of liquefied natural gas has also increased (from 426 to 593 vessels). At the same time, more moderate growth rates are forecast in the container and bulk cargo sectors. First of all, this is due to the fact that the size of the ships will increase, and not their number (UNCTAD, 2022).

According to the International Chamber of Shipping (ICS) and Baltic International Maritime Council (BIMCO) joint Seafarers Workforce Report 2021, since 2015 the demand for officers, qualified according to the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended, has risen 11.8%. If the supply of seafarers does not increase, a shortfall of 26.000 STCW-qualified officers is expected by 2026. The

baseline demand forecast calls for almost 18.000 new employees to be brought on annually to meet a projected demand of 947.000 new seafarers in 2026 (ICS, 2021).

Drewry also notes that an expected record shortage of officers will reach 50,000 in 2023, which is 7% of the required level. The situation will become even more difficult by 2028, when the shortage will reach 10%. At the same time, according to Drewry, the growth in the supply of seafarers in 2018-2023 slowed down significantly compared to the growth shown in the period from 2013 to 2018: from 3% per year to 0.3%, respectively. Drewry noted that the decline in the supply of seafarers was due to the stagnation of wages compared to alternative offers onshore (especially for European seafarers), the decrease in the overall attractiveness of work at sea, accelerated rate of retirement of older seafarers due to the global Covid-19 pandemic (Drewry, 2023).

The expected shortage of seafarers could become more acute by 2030 due to the growth of the shipping industry, as well as the development of new technologies, including automation, digitization and decarbonization. Guy Platten, Secretary General of the ICS emphasises that the maritime industry must actively promote the profession of seafarer and create new opportunities for maritime education and training around the world, focusing on the new knowledge and skills required for a more environmentally friendly and digitised shipping industry (ICS, 2021).

2.4. Onshore maritime labour market

The international maritime labour market for onshore maritime professionals is also highly globalised and can be characterised by a high degree of mobility. Global international shipping standards in the field of maritime safety and security, maritime environmental protection, shipping finance and insurance, ship maintenance and others, allow a qualified professional with the necessary set of experience, knowledge and skills to move freely between different maritime enterprises in different countries.

International maritime business centre is a combination of core shipping business activities in one geographical location, creating opportunities for efficient and

sustainable maritime development (China Economic Information, 2022). Since 2014, the China Economic Information Service, in cooperation with the Baltic Exchange, has published the "Xinhua-Baltic International Shipping Center Development Index". The 2022 report is a ranking of 43 major international maritime centres based on an assessment of the availability of maritime business services (which is 50% of the overall ranking), such as the number of ship brokers and managers, the number of liner and bulk shipowners, the number of classification societies, the number of maritime lawyers and arbitrators as well as the number of banks and shipping finance providers. The index also takes into account general environmental factors (30% of the rating score), such as government transparency, degree of e-government and administration, customs tariffs, logistics efficiency index; and port infrastructure development (20% of the rating score), which include container throughput (TEU); throughput of bulk cargo (tonnes), liquid cargo throughput (tons), number of cranes; length of container berths; port draught (m). The availability of maritime professionals directly affects the quality of services provided by the two most significant criteria that are taken into account when determining the index (China Economic Information, 2022).

Singapore has ranked first in the International Shipping Centre Development Ranking for the past nine years, with a total score of 94.88 out of 100 points. The Singapore International Maritime Centre employs more than 160,000 people from various maritime professions, both in the port sector (port pilots, domestic seafarers) and onshore in the sectors of maritime finance, maritime law, engineering, maritime consulting and others (Ministry of transport of Singapore, n.d.). Due to the significant growth in shipping in the Asian region, many of the leading shipping and ship brokerage companies have offices in Singapore, as well as more than 30 of the largest marine insurance companies and P&I clubs. As a result, Singapore has one of the world's highest concentrations of maritime professionals and has developed itself as a world centre for maritime services.

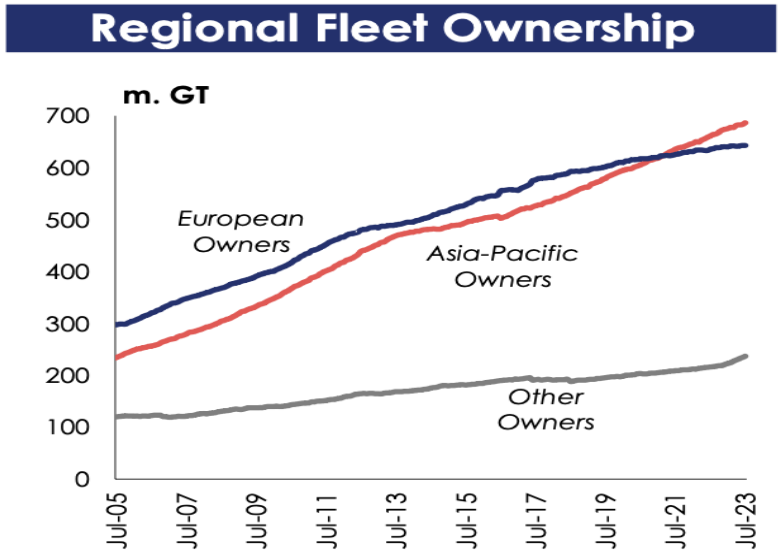
The Top-10 international maritime centres also include London, Shanghai, Hong Kong, Dubai, Rotterdam, Hamburg, New York/New Jersey, Athens/Piraeus and Ningbo-Zhoushan. As noted in the Report, "*there is no quick or reliable solution to*

becoming a successful maritime hub" (China Economic Information, 2022, p. 18). Many of the top 10 centres have developed over the centuries. All the top 10 international maritime centres are in constant competition for the best talent, business and cargo. In general, in developing countries – traditional providers of seafarers to the international maritime labour market, there is not one of the international maritime centres included in the Top 20, except China, where seafarers mostly work on ships flying the Chinese national flag.

Ship ownership and ship management are the sectors that provide the main onshore employment in the transition from seafaring to onshore maritime jobs. According to the UNCTAD Review of Maritime Transport 2022, Greece is the largest ship-owning country in the global fleet, ranked by a carrying capacity in dead-weight tons. In total, Greek shipowners, as of 2022, controlled 4870 vessels, with a deadweight of 328,430,215, which was 17,63% of the global tonnage. More than 85% of Greek ships were registered under foreign flags. The top 10 largest ship owning countries in 2022 also included China, Japan, Singapore, Hong Kong, the Republic of Korea, Germany, Bermuda, Norway and the United Kingdom. In total, the TOP-10 countries of shipowners controlled 68.82% of the global tonnage of ships. At the same time, the share of shipowners from the Asia-Pacific region was 39.19% (UNCTAD, 2022). Clarksons Research, in its World Fleet Monitor as of July 2023, also points to an increase in the tonnage of Asia-Pacific shipowners. Japan and China are the largest customers for newly built ships. The top 10 also includes Greece, France, Italy, South Korea, Singapore, Norway, Denmark and Belgium. In general, since 2013, the tonnage of new vessels ordered by shipowners in the Asia-Pacific region has consistently exceeded the tonnage of new orders by European shipowners and ship owners from other regions (Clarksons Research, 2023).

Figure 2

Regional Fleet Ownership



Source: Adapted from "*World Fleet Monitor",* by Clarkson Research, 2023 (https://www.clarksons.net/wfr/) Copyright 2023 by Clarkson.

The ship finance sector is an important element of geopolitical influence and lobbying for the development of the maritime industry, and at the same time a sector that generates significant employment for onshore marine professionals. According to data, provided by the Petrofin Research company, the total shipping finance market for 2022 was estimated at $525 billion, including $350 billion in bank financing, as well as leasing, export financing and funds. The loan portfolio of the 40 largest banks financing the shipping industry was $289.39 billion. The top 40 world largest shipping banks include 19 European banks, 18 from the Asia-Pacific region and 3 North American banks. The presence of Japanese banks in the top 40 has increased significantly and currently stands at 11 banks. The market share of Asian and Australian banks in the volume of ship financing is constantly increasing, and has increased from 15% in 2010 to 44% in 2022. Conversely, the share of European banks in the global shipping portfolio in 2022 is 49.5% vs. 83% in 2010 (Petropoulos, 2023).

2.5. Conclusions for Chapter 2

The maritime industry is a unique globalised sector of the international economy that ensures transportation of goods in global supply chains. The industry continues to grow both in terms of the volume of traffic and the number of ships that serve this transportation, as well as the new technologies that are used in shipping. The maritime industry is also a powerful job regenerator for both seafarers and maritime professionals ashore. Due to the unified international standards and common practices, the maritime industry has a unique labour mobility compared to other industries both for seafarers and onshore maritime professionals.

The shipping industry is already experiencing an acute shortage of skilled maritime professionals both among seafarers and maritime professionals ashore. In the short term, the shortage of seafarers may become even more acute due to the expected end of a career at sea for older seafarers who are experiencing difficulties in the transition to new technologies, as well as due to a possible significant decrease in the supply of seafarers from Ukraine and the Russian Federation.

Chapter 3. Current and future challenges for maritime labour market

3.1. Introduction

This Chapter presents a description of the UN's Human Resource Development policy which aims to address inequalities between developed and developing countries in terms of access to education, knowledge and skills, and to ensure equitable distribution of human resources. The Chapter provides an analysis of the impact of new technologies, including the processes of digitalization and decarbonization, on the structure of the international maritime labour market both for seafarers and onshore maritime personnel. It also describes new requirements for the education, training and skills of seafarers and shore-based maritime personnel, as well as changes in career planning and development of maritime professionals associated with these new requirements.

3.2. UN Human Resource Development

The UN General Assembly at its 74th session approved the Human Resource Development resolution, which emphasised that "*human resources development lies at the heart of sustainable development in its three dimensions and that health and education are at the core of human resources development*" (UN, 2020). The UN Secretary General António Guterres in the Summary to the Report on Human Resource Development (UN, 2019, p. 1) underlined that "*countries face the challenge of making use of technological developments to foster economic growth and employment, while at the same time ensuring decent working conditions, social protection and equal opportunities for all*".

The digital revolution is rapidly changing the labour market, as well as the nature of work, the requirements for workers' education, training and skills, the quality and productivity of work. This has a huge impact on the organisation and choice of production site, and, as a result, on the distribution of jobs, their quantity and quality. New business models can not only have positive effects, but also negative impacts by increasing inequality, job losses, devaluing worker skills, and widening skills gaps.

The main task of governments is to use technological progress to ensure sustainable development and improve living conditions. At the same time, governments should not allow income inequality to widen. To achieve this target, **governments must continually invest in the development of human capital** (UN, 2019).

More skilled workers with the right skills and richer countries benefit primarily from technological progress. More developed countries are quicker to adopt new technologies as they require significant investment. Increasing demand for highly skilled workers without an accompanying increase in the supply of workers with the necessary skills will increase wage inequality. The UN Secretary-General emphasises that growing inequality in the level of skills and wages of workers both within and between countries can slow down progress towards the UN SDGs achievement (UN, 2019). At the same time, brain drain is still a significant problem for developing countries (UN, 2020).

Education and skills are key to the future sustainable development. Increasing the level of personal and national potential, education, skills are of key importance for poverty reduction and economic development. The UN Human Resource Development Report notes an increase in demand for various forms of technical competence such as coding and programming. At the same time, the role of such skills as creativity, critical thinking, originality, initiative, flexibility, the ability to solve complex problems, the ability to persuade and negotiate is significantly increasing. A skilled worker with a broad outlook for the development of innovation and creation, able to interact with machines will be the most valuable in the labour market.

Ensuring the school-to-work transition is critical, especially for developing countries, many of which lack the capacity to make the necessary investment in education. New technologies may be available in the workplace. Under these conditions, the development of on-the-job training is extremely useful and necessary for young people to acquire the required skills. This is especially true in the maritime industry, where shipboard experience is a key prerequisite for career advancement. However, many developing countries are unable to provide cadets of maritime academies with access to work on ships during their studies.

Technological changes, new requirements for education and skills require that a person be given flexible opportunities to acquire the necessary skills at each stage of his/her professional development. Educational and training systems should be closely linked to labour markets in order to provide workers with the necessary knowledge and skills in a timely manner. Employees must have clear career paths in order to be able to successfully enter the labour market, undergo retraining at the right time and successfully return to work at a higher professional level. Such career opportunities should ensure that employees remain motivated throughout their careers.

Governments, employers and trade unions should work together to create and use various options to support and encourage workers to learn throughout their professional lives. In particular, consideration should be given to recognizing and validating non-formal learning, as well as providing flexibility in response to new demands on the knowledge and skills of workers. The role of business in retraining and acquiring new in-demand skills by employees should be significantly increased by organising on-the-job training and attracting instructors and mentors. Governments, employers and trade unions should jointly develop programs on job prospects in strategically important sectors, possible career paths, and the knowledge, skills and ways to acquire them necessary for professional development.

Technological advances make issues of equity and fairness increasingly relevant, given that different countries have different access to new technologies. To overcome inequality, it is necessary to find a balance between getting the maximum effect from new technologies; ensuring equal access to new technologies both between countries and within countries; equal distribution of benefits; and ensuring that new technologies comply with morality, ethics and human rights. This requires the development and implementation of clear programs for the development and accumulation of human capital.

The UN General Assembly stressed the need for governments to pay special attention to human resource development, taking into account the need to constantly adapt to new technologies. States are encouraged to assist employees in career planning, training and retraining by introducing various forms of training, financial

incentives and social guarantees. It is essential to introduce **intersectoral approaches and mechanisms to determine the needs of various sectors of the economy in the development of human resources in the medium and long term**. The Assembly also called on UN agencies to support national efforts to develop institutional capacity for human resource development (UN, 2020).

3.3. Impact of decarbonization on the maritime employment

The IMO underlines that most of the elements of the 2030 Agenda for Sustainable Development will only be realised with sustainable maritime transport (IMO, n.d). The United Nations defined "sustainability" as "*meeting the needs of the present without compromising the ability of future generations to meet their own needs*" (UN, n.d.). Sustainability includes three key elements or pillars: environmental, economic, and social. All three elements interact with each other and form sustainable shipping. Imbalance between these elements leads to non-sustainability (Car et al., 2021). The main objectives of sustainability in shipping are to minimise economic costs, mitigate adverse impact on the environment, enhance social justice and improve working conditions (Shin et al., 2018).

Sustainable and green shipping currently provides shipowners with competitive advantages, but *«in the nearest future it will become a licence to operate»* (Maersk Mc-Kinney Moller, 2022). To navigate the changing environment and maximise the benefits and values of ESG, all maritime actors **must adopt a structured approach to the new policy development processes**. Sustainability is becoming a must, and the maritime actors must quickly adapt to the new ESG requirements. The companies' ESG profile can be critical for investors, which is very important as the maritime sector is highly capital intensive and requires long-term investments (Nõmmela & Kõrbe Kaare, 2022), and may have significant impact on the performance and risk profiles of companies (NSA, 2021). Shipping companies that actively implement ESG standards, including decarbonization technologies, already have competitive advantages in the market, as consumers of transport services perceive

them as more sustainable and responsible. For instance, DNV notes that companies' ESG reports should include information on greenhouse gas emissions and other air pollutants, business ethics, employee health and safety, and accident and safety management (DNV, 2021).

Decarbonization is one of the highest priorities for the maritime industry and at the same time is the most difficult challenge shipping is facing over the next decades (Hoffmann, 2022). The maritime industry contributes to about 2.9% of total global emissions (DNV, 2023; McKinsey, 2021). The maritime industry strives to significantly reduce greenhouse gas emissions and contribute to global sustainability. Currently, only 46% of the largest shipping companies have IMO or zero commitments, and only 41% have GHG and sustainability reporting (Maersk Mc-Kinney Moller, 2022). As a result, the shipping industry is under increasing pressure to reduce its environmental impact in terms of reducing greenhouse gas emissions into the atmosphere. The main consumers of shipping services, as well as maritime financial providers and banks, in the face of growing public demand for sustainable development, are forcing shipowners to invest in new green and carbon-free technologies.

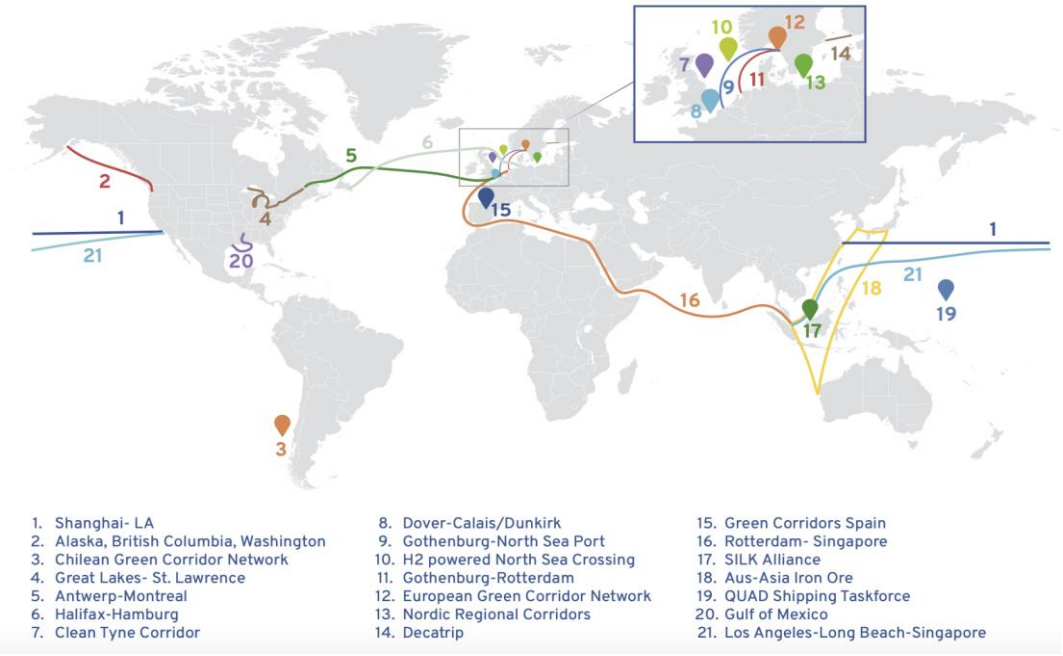
Decarbonization will have the biggest impact on shipping due to current and new emissions restrictions that are being put in place globally and locally (DNV, 2023). In July 2023 the IMO adopted the 2023 IMO Strategy on Reduction of GHG Emissions from Ships; further, individual States have set targets to reduce GHG emissions (IMO, 2023). The strategy aims to reach net-zero GHG emissions from international shipping "close to 2050" on a well-to-wake basis, with indicative checkpoints set in 2030 (to reduce annual GHG emissions by at least 20%, but striving for 30%, of 2008 levels) and 2040 (by at least 70%, but striving for 80%, of 2008 levels). Currently, new rules have been adopted, such as the inclusion of shipping in the EU Emissions Trading Scheme (ETS), EEXI and CII IMO ratings. These requirements will significantly affect all major shipping operations, including the operation of ships. According to UNCTAD, as of March 1, 2022, almost 40% of the order books of shipyards are marine vessels capable of operating on one or more types

of fuel (UNCTAD, 2022). By 2030, technologies such as electrified marine engines and LNG engines will increasingly appear on ships. These technologies can already be characterised as sufficiently reliable and stable. Working with such propulsion systems will require new skills both among seafarers and for shore personnel of companies providing new technologies and their maintenance.

Shipowners, port operators and other maritime stakeholders must provide the necessary infrastructure to decarbonize the shipping industry. In 2022, at the 26th Conference of the Parties of the UN Framework Convention on Climate Change, 24 countries jointly signed the Clydebank Declaration, which aims to create at least six zero-emission green corridors by 2025 – fully decarbonized sea routes between two or more ports (UNCTAD, 2022). Talalasova et al. (2022, p. 1) defines green corridors as "*specific shipping routes where the technological, economic and regulatory feasibility of zero-emission shipping is catalysed by a combination of public and private action".*

Figure 3

Green Ship Corridors 2022



Source: Adapted from "Annual Progress Report on green shipping corridors 2022" by Talalasova, E., Boyland, J., Garvin, B., Fahnestock, J. *Global Maritime Forum*., (https://www.globalmaritimeforum.org/content/2022/11/The-2022-Annual-Progress-Report-on-Green-Shipping-Corridors.pdf).

As of November 2022, there are 21 green corridor initiatives announced worldwide. According to these initiatives, by 2027-2030, the declared shipping corridors will either be completely decarbonized, or the first zero-emission ships will operate on the routes. However, for most corridors, the ultimate goals of decarbonization remain uncertain. Of the 21 corridors announced, 12 green corridors cover short sea routes, 7 – deep-sea, 2 – require additional determination. Most of the short green corridors will be in the Baltic and Seven Seas. Potential endpoints of green shipping corridors are located in 16 developed and four developing countries. Container shipping and ferries are the main focus for decarbonization in the six green

corridors. Dry cargo, tanker and cruise segments are also represented. Target sectors for decarbonization still need to be identified for the 10 corridors that are at the pre-feasibility stage (Talalasova et al., 2022).

Investment in new technologies will be crucial to ensure the competitiveness of both individual shipowners and the country as a whole. Despite such a significant number of orders for vessels capable of operating on alternative fuels, in general, the current fleet of seagoing vessels continues to noticeably age. The lack of necessary infrastructure in some regions may divide shipping into a two-tier system of ports and corridors, of which only a small part will meet the requirements. This may lead to a reduction in potential shipping routes and affect competition in the shipping industry (UNCTAD, 2022).

Decarbonization is also creating a new threat to the global maritime labour market. Shipowners must ensure a timely transition to new types of fuel, which, among other things, requires the need for seafarers and shore personnel to prioritise new knowledge and skills (UN Global Compact, 2021). Stephen Cotton, the Secretary General of the ITF, underlined that decarbonization of the shipping industry will only happen if seafarers are actively involved at all levels (ITF, 2021). Safe and healthy working conditions for seafarers must be guaranteed in any case, and seafarers must receive the necessary additional training. The use of new, environmentally friendly and more automated technologies should not be used as an excuse to reduce crew numbers of seafarers onboard or to attack jobs or working conditions. According to a survey conducted by DNV (2022), more than 75% of seafarers indicated that they would require partial or complete training in fuels such as LNG, batteries or synthetic fuels. Nearly 87% of respondents indicated the need for partial or complete training in new fuels such as ammonia, methanol and hydrogen.

3.4. Impact of digitalization on the maritime employment

Digitalization is one of the main drivers that will significantly change the maritime industry in the near future (DNV, 2023; Ölçer et al., 2023). Digitization in

the maritime industry includes the use of artificial intelligence (AI), Internet of Things (IoT), machine learning (ML), blockchain, connectivity, 3D printing, computer-based simulation and modelling and other technologies. For example, a "digital twin" of a ship can be created using the technology of the Internet of Things. The use of such a twin makes it possible to safely simulate conditions similar to those that may occur on board. Artificial intelligence (AI) and Machine learning (ML) technologies make it possible to simulate the process of human decision-making. This allows changing the traditional operational processes on ships, and at the same time leads to a reduction in the required number of crew members until the emergence of fully autonomous ships. New technologies can significantly improve maritime safety, reduce costs by optimising traffic routes and supply chains, ensure remote control of ship equipment, enhance transparency, and ensure the well-being and health of seafarers (DNV, 2023) and even create new sub-sectors in the maritime industry.

The maritime digitalization market can be segmented based on various criteria. WMU researchers have identified six new technology clusters: navigation technologies (autonomous); remote and automated control of equipment (motors and generators); automated and remote maintenance and repair; handling and storage of goods; operational control technologies; and body technologies (Alamoush & Ölçer, 2023). Based on the technologies used, the maritime digitization market is divided into IoT, AI, blockchain and others. Software products can be created for ship management, tracking, energy efficiency, inventory management and ongoing maintenance (Allied Market Research, 2023).

The maritime digitalization and automation market is a fast-growing sector that creates new opportunities for businesses and governments (DNV, 2023). Moreover, the COVID-19 pandemic has had an additional stimulating effect on the development of this market, as shipowners faced supply chain disruptions and sought to increase efficiency and reduce costs through the introduction of new digital technologies. In 2021, global maritime digitalization was estimated at $157.4. The maritime technology market was growing 18% faster than expected before the pandemic, according to Signal Ventures (China Economic Information, 2022). It will reach $345 billion by

2030 and is projected to reach $423.4 billion by 2031, an increase of 10.7% on average between 2022 and 2031 (Allied Market Research, 2023). The IoT segment has the highest market share, in particular technologies aimed at optimising maintenance, cargo handling and route planning. At the same time, analysts predict that in the near future the artificial intelligence (AI) segment will demonstrate the greatest growth, which has significant potential for application in shipping for business process optimization, voyage planning and ship maintenance, as well as to analyse large amounts of data to improve decision-making.

The largest supplier of marine digitization technologies is the North American region, where key players and the latest technological advances are concentrated. The Annex C of the WMU Transport 2040 Research also provides a list of 24 operational software and providing companies, most of which are located in the Scandinavian countries (Denmark, Norway, Sweden and Finland), in addition to other European countries (Germany, Greece, Italy, Iceland). ABB Marine Academy (Switzerland/Sweden), Wartsila Academy (Finland), Kongsberg Maritime (Norway), Rolls-Royce (UK), Siemens Energy Offshore Marine Center (Germany), Yara Marine Training Academy (Norway), and Alfa Laval (Sweden) were included in the list of the maritime technological training providers (Ölçer et al., 2023). As a result, the large concentration of maritime IT start-ups and research projects in European countries, in particular in Scandinavia, in combination with high living standards, makes this region the most attractive for the most highly qualified maritime professionals when looking to work in the maritime digitalization sector. At the same time, it is predicted that in the near future the Asia-Pacific region will demonstrate the highest growth rates (Allied Market Research, 2023).

Digitalization and automation are significantly changing the working and employment conditions in shipping. Seagoing vessels are becoming smarter through the use of new digital solutions and sensors. The work profile of many maritime specialties is changing significantly, at the same time as new maritime specialties are emerging, such as drone operators, VR instructions and others. Seafarers need new knowledge to make decisions based on the full range of information and data coming

from various automated systems. According to WMU research, over 81% of seafarers indicated that they need partial or full digital training. Almost 70% of seafarers indicated that they used simulators, virtual reality or other digital environments in their training, of which 60% (deck and engine officers 65%) indicated that such training methods helped them develop their skills. Only 10% (deck and engine officers 9%) disagreed (Kitada et al., 2023).

To remain competitive, shipping companies must use all the digital technologies available to them. The move to new technologies has already created a role for a new type of maritime professional – the data scientist – to manage platforms, standardise and extract insights from data (China Economic Information, 2022). Seafarers will continue to play an important role in the shipping industry, but some of their tasks and functions will be transferred to shore control centres.

A Shore Control Centre (SCC) is a new division of shipping companies and ship management for remote control and monitoring of ships, tracking the main parameters of ship mechanisms, monitoring emissions, fuel consumption and providing support to ship crews. The tasks and responsibilities of SCC operators may vary depending on the type of vessel, the level of their automation, the sea areas of operation of the vessel. SCC operators can access a variety of traditional technologies, including virtual reality (VR) and augmented reality (AR) technologies. A significant amount of maintenance and even repair of the ship's engineering systems will also be performed remotely from the SCC by the Artificial Chief Mechanic (ACF), AI software (Alamoush & Ölçer, 2023).

Shore Control Centres open up new career paths for seafarers to work onshore. Working in such centres can be attractive for seafarers with a stable work schedule, safe working conditions, and proximity to their loved ones. Moreover, working at SCC enables seafarers to continue to use their seagoing experience, maritime knowledge and skills in the shipping industry. At the same time, SCC creates unique and promising career opportunities for individuals who do not have a maritime education, but who have knowledge in the field of information technology, telecommunications or engineering (DNV, 2023).

The shortage of qualified personnel and the lack of standardisation are the main factors holding back the rapid growth of the maritime digitization market. Due to the lack of standardisation, ship owners are often forced to increase their costs in order to invest in several software products at the same time. It also results in challenges for seafarers and shore personnel who must learn to operate a variety of software, often in a very short time, in the face of fatigue from routine shipping operations. The lack of training and educational opportunities for marine professionals does not allow timely acquisition of skills in working with digital systems (Allied Market Research, 2023). The apparent rapid development of maritime digitalization and automation highlights the need to adapt existing maritime education and training systems to meet the needs of the maritime industry for professional, motivated maritime personnel.

Shipping companies have noted they will rely less on workers with maritime education backgrounds. When looking for qualified personnel, companies will hire graduates from non-maritime educational institutions (+12.3%); Outsourcing management or special activities (+10.8%); Recruiting part-time/temporary employees (+6.9%); Outsourcing part of vessel operation functions (+4.6%); Recruiting part-time/temporary operation staff (+3.8%). Respondents also note the difficulty of attracting and retaining young talented seafarers in the maritime industry in the future (Kitada et al., 2023).

The maritime industry, like any other sector, needs young talent. The rapid transition of shipping to the use of digital technologies makes this industry more attractive for employment. In the coming years, competition for the best maritime professionals with the necessary digital skills will increase significantly in the international labour market. At the same time, new developments require large investments. which are only available in major international maritime hubs.

3.5. Career pathways for seafarers and onshore maritime professionals

Maritime professionals are already required to have not only technical knowledge, but also to develop soft skills, such as problem-solving abilities, project management, communication and teamwork skills. Seafarers at the management level must possess and develop leadership skills to continually motivate, manage and inspire their crews. In order to successfully advance in their careers, seafarers and other maritime professionals must remain motivated to learn throughout their professional lives and constantly adapt to new challenges that are constantly changing due to rapid advances in technology (Ölçer et al., 2023). Moreover, seafarers' personal skills will be critical to the adoption and effective use of new technologies in shipping. A lack of soft skills will have a more detrimental effect on vessel and crew efficiency than a lack of technical skills (DNV, 2023).

Rapid introduction of new technologies may increase the problem of a shortage of qualified and motivated maritime professionals both on ships and in the onshore sector. In the context of a shortage of qualified personnel, the most experienced and qualified seafarers with updated knowledge will have a better position in the international maritime labour market, which will allow them to have better employment conditions. Shipowners must also quickly adapt to new realities in the employment market and provide the most qualified seafarers with permanent employment contracts, thus motivating seafarers for professional development throughout their professional lives.

Digitalization and automation are enabling the maritime industry to be more efficient and competitive. The IMO stresses that new technologies such as autonomous ships and developments in the port sector are critical to the development of merchant shipping and the stability of international supply chains and are, therefore, a key enabler for achieving many of the SDGs, including to achieve the SDG 9 "Industry, Innovation and Infrastructure" (IMO, n.d.). This fast moving and technologically advanced industry require highly trained seafarers at both officer and rating levels. According to the DNV survey, 55% of respondents noted that the further development of new technologies, the digitalization of ships, as well as developments in the field of

alternative fuels, can not only retain existing seafarers but also attract new talented young seafarers to the industry (DNV, 2023).

The maritime industry needs to change its approach to the education, training and skills development of seafarers. The minimum education, training and skill requirements for seafarers set out in the STCW Convention, as amended, are no longer sufficient to meet the growing demand of the shipping industry for qualified maritime personnel (DNV, 2023). Selkou and Roe (2022, p. 132) emphasise that "*the IMO is continually reactive and is playing a "catch-up" agenda: by the time a convention or amendments comes into force, parts of it may already be out of date*". In addition to new green knowledge and skills, digital training must be included in basic seafarer training.

Maritime academies and maritime training providers must change their curricula in time to meet the needs of the maritime industry for maritime professionals with a new set of knowledge and skills. The future model of maritime education may consist of two main stages. In the first phase, maritime academies will provide basic maritime education and skills to seafarers. At the second stage, shipowners will train seafarers to work on specific types of ships and provide knowledge and skills to work with new types of fuel (DNV, 2023). Retraining and advanced training programs for existing seafarers must also be adapted to new technological challenges. All maritime stakeholders should strive to ensure equal access to maritime education for all seafarers, regardless of their country of citizenship or residence.

New technologies can also be used to train seafarers (Emad & Shahbakhsh, 2022), in particular remote learning technologies and virtual reality technologies, which will allow seafarers to overcome the fear of new technologies at the training stage. Training using virtual reality technologies is especially useful in situations where it is impossible and extremely dangerous to reproduce a real emergency situation (Chubb, 2020). At the same time, the use of new technologies to train seafarers requires significant investments, including expensive simulators and VR/AR equipment. Access to such technologies may be limited for most developing countries – the main suppliers of seafarers. As a result, ensuring accessibility of maritime

education will directly affect the quantity, and most importantly, the quality of training of maritime professionals. To ensure accessibility of maritime education, all maritime stakeholders should strive to develop partnerships, including those based on the principles of effective cross-party social dialogue between governments, shipowners and trade unions, as well as the broad application of public-private partnership experience.

New technologies place new and higher requirements on the knowledge, skills and competencies of maritime professionals and will significantly change career paths in the shipping industry in the near future. Further development of "smart" and "green" technologies in the maritime industry will lead to the creation of new maritime professions, new jobs and changes in career paths. Seafarers must have necessary knowledge and skills, as well as be physically and mentally healthy, to be able to work safely and productively with new technologies on board. New maritime professionals will be more productive, which will allow shipowners to gain additional competitive advantages (Ölçer et al., 2023).

Seafarers with advanced digital skills are more likely to be employed ashore and will be able to adapt faster and more easily to the new digital reality of the maritime industry. The maritime industry needs to create new structured career paths both for seafarers and onshore personnel. Approximately 38% of the seafarers interviewed by the DNV indicated that career advancement is still a major challenge for them (DNV, 2023). Failure to provide seafarers with clear career plans can become a serious problem for shipowners who have invested in seafarer training may lose money due to a decrease in seafarer motivation or the transfer of seafarers to other shipowners. Investing in seafarers will allow companies to provide the necessary conditions for sustainable development and be competitive not only for their customers, but also in the labour market for maritime professionals.

Lack of clear career paths can result in the loss of experienced and talented workers, leading to a skills shortage in the industry. The industry needs to consider some fundamental changes to address this issue in the future. New technologies may bring significant benefits to the maritime industry, but they may also pose new threats

to shipowners, seafarers and governments. These threats are related to the growing problem of a shortage of qualified maritime professionals and the growing gap in the necessary knowledge and skills to work with new technological solutions and automated ship equipment. The development of maritime human capital requires significant investment from governments, shipowners and other stakeholders.

National maritime policy makers, shipowners and seafarers' unions need to determine in a timely manner the directions for the development of maritime human capital, as well as the necessary skills, oriented to meet the new needs of the maritime industry. A new model for the education and training of seafarers should be developed as soon as possible. However, the DNV recommends a model in which maritime training institutions focus on developing basic/general skills of seafarers, and shipowners on developing training and skills for specific types of ships and fuels (DNV, 2023).

3.6. Conclusions for Chapter 3

The work of seafarers still remains unnoticed by the public. New technological changes and decarbonization will help create new jobs in the maritime industry onshore, giving this vital industry greater visibility and the ability to attract the most talented young men and women. The maritime industry is undergoing significant change due to the rapid development of automation and digitalization technologies and the desire to ensure the decarbonization of shipping. These factors have a significant impact on the maritime labour market. The process of transition of the maritime industry to new technologies should take into account the educational and training needs of seafarers and shore-based maritime personnel and ensure that the competence, knowledge and skills required at each stage of professional development can be acquired (Ölçer et al., 2023). Meeting these new demands will require the creation of opportunities for lifelong education and training.

The development and implementation of new technologies in the maritime industry requires significant investment and proceeds unevenly across regions. The

creation of new jobs for onshore maritime professionals is centred around the largest international maritime hubs. With the development of a network of green sea corridors, the operation of which will require seafarers and onshore marine personnel with specialised knowledge, may lead to the formation of separate maritime labour markets, each with its own most specific maritime job profiles:

1) The Asia-Pacific maritime labour market will be characterised by a growing maritime finance sector. The largest countries as beneficial owners of maritime vessels are China, Japan, Singapore and the largest countries as suppliers of seafarers are the Philippines, China, India, Indonesia and Myanmar. The Asian-Pacific labour market for onshore maritime professionals will continue to develop around international maritime hubs such as Singapore, Hong Kong, Shanghai and Dubai and will be characterised by an increase in the share of their business in the main sectors of global shipping.

2) The European maritime labour market will be characterised by strict decarbonization requirements and the rapid development of autonomous shipping on short voyages between EU ports. Such conditions will require special education, training and skills for both seafarers and shore-based maritime professionals. The main suppliers of qualified personnel to this labour market will be the countries of Eastern and Central Europe (Ukraine, Romania, Bulgaria, Poland, Croatia), and the main onshore employment centres, including onshore ship control centres will be concentrated around traditional international maritime hubs in the Scandinavian countries, and also in Rotterdam, Hamburg and London. The European onshore maritime labour market, due to high living standards, will be characterised by a high degree of attractiveness for labour migration of the most qualified maritime professionals from Eastern Europe and Africa;

3) The African maritime labour market will be characterised by the greatest availability of young labour resources, and at the same time the lowest access to modern maritime technologies, including maritime IT systems, which will be used in the education and training of seafarers. This market will also be characterised by

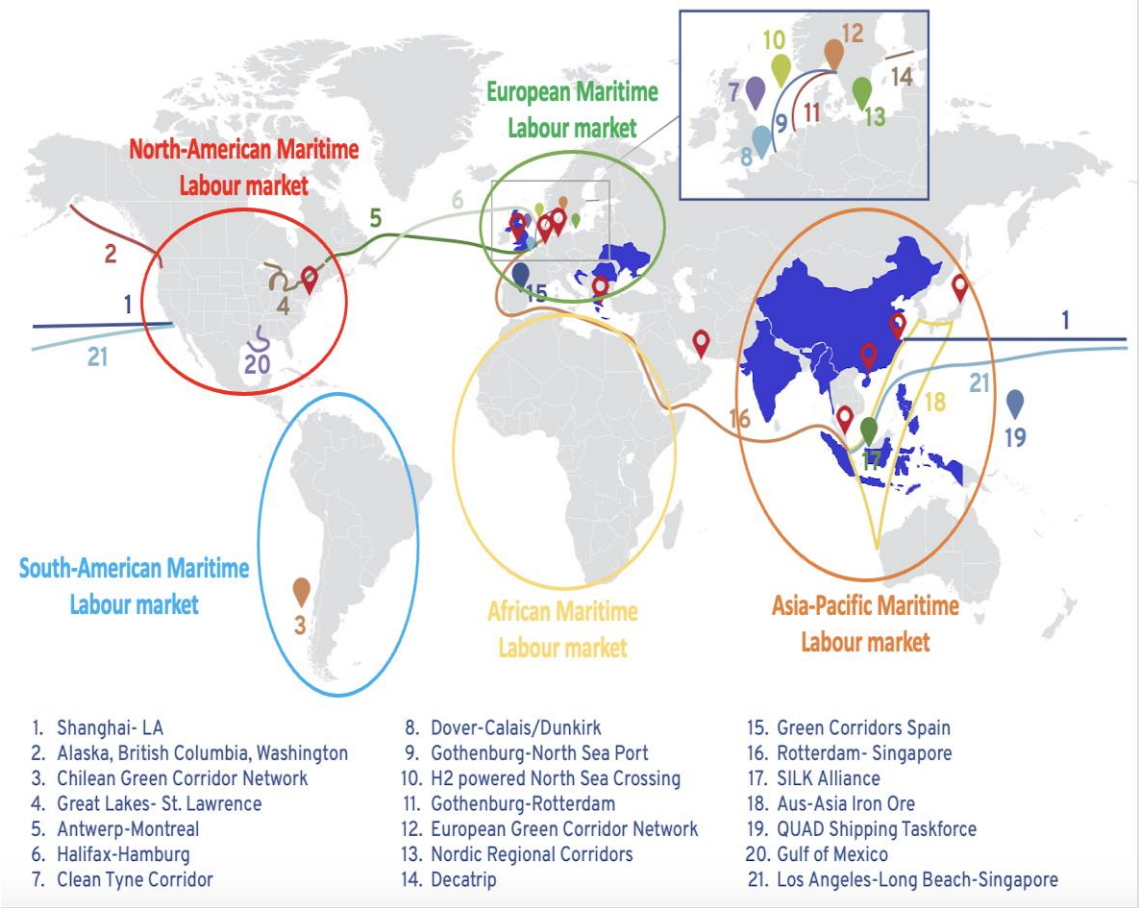
extremely low attractiveness for the employment of offshore and onshore professionals.

4) The North American maritime labour market will be characterised by high demands for decarbonization, maritime safety, maritime security, and broad access to maritime IT systems. At the same time, the seafarer labour market will continue to be characterised by limited access for seafarers of other nationalities to work on US-flagged ships due to the requirements of the US Jones Act. The maritime labour market for onshore professionals will continue to be predominantly concentrated in the maritime finance sector in the United States.

5) South American maritime labour markets will be characterised by low levels of employment for onshore maritime professionals, especially in the maritime IT sector. The maritime seafarer employment market in the region will advantageously serve the needs of regional shipping with the low supply of global maritime shipping.

Figure 4

Possible Composition of the Future Maritime Labour Market



Source: Author's creation.

Chapter 4. Seafarers' perspective for career development and employment in the maritime industry

4.1. Introduction

This Chapter provides an overview of the results of a survey of seafarers using an online questionnaire to assess seafarers' understanding of their maritime career path, and an assessment of seafarers' needs for the knowledge, skills, forms and support they need for their professional development.

4.2. Instrumentation and data collection

The main aim of the survey was to collect evidence-based data for the conclusions drawn from the analysis of the impact of current and future challenges on the international maritime labour market, as well as to assess seafarers' understanding of their career path in the seafaring profession and their readiness for a just transition to work in the maritime industry onshore.

To conduct a survey, a questionnaire was prepared for self-completion using the online service www.questionpro.com, which provides free access for all seafarers, regardless of their country of residence. The use of an online questionnaire was chosen as a method for collecting data, since this method allows for the collection of a significant amount of data in a short time without geographical restrictions, and also minimises the risks of bias and lack of objectivity that may occur during interactions between people. The questions were formulated as practical as possible so that they were understandable to respondents with different levels of professional experience. Seafarers were also given the opportunity to provide their comments and options for answering the questions raised. The questionnaire had two sections. Part A dealt with the demographic profile of seafarers and Part B consisted of a set of questions that helped the researcher understand what career opportunities and needs seafarers have depending on their country of citizenship and professional profile. Prior to distribution to target respondents, the researcher pilot tested the questionnaire to his colleagues

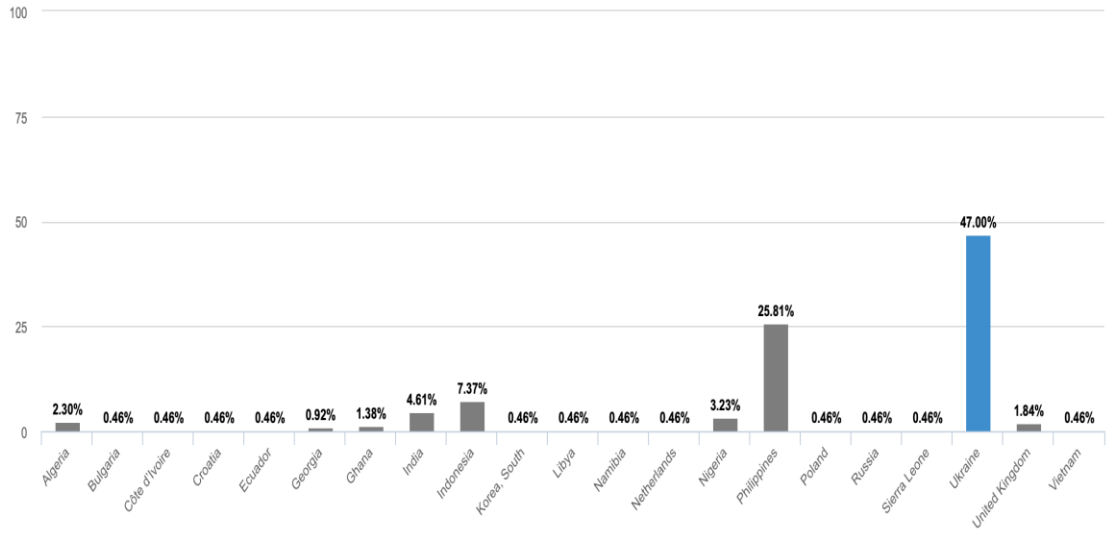
from the World Maritime University [WMU]'s MSc in Maritime Affairs program. The survey results were analysed automatically by the site service and were imported into Microsoft Excel and saved in PDF format.

4.3. Demographic profile of respondents

The survey covered 217 seafarers representing 21 nationalities from developing and developed countries. The majority of respondents are from traditional developing countries that supply seafarers to the international maritime labour market: Ukrainians – 47%, followed by Filipino and Indonesian seafarers – 25.81% and 7.37% of respondents, respectively.

Figure 5

Nationality of respondents



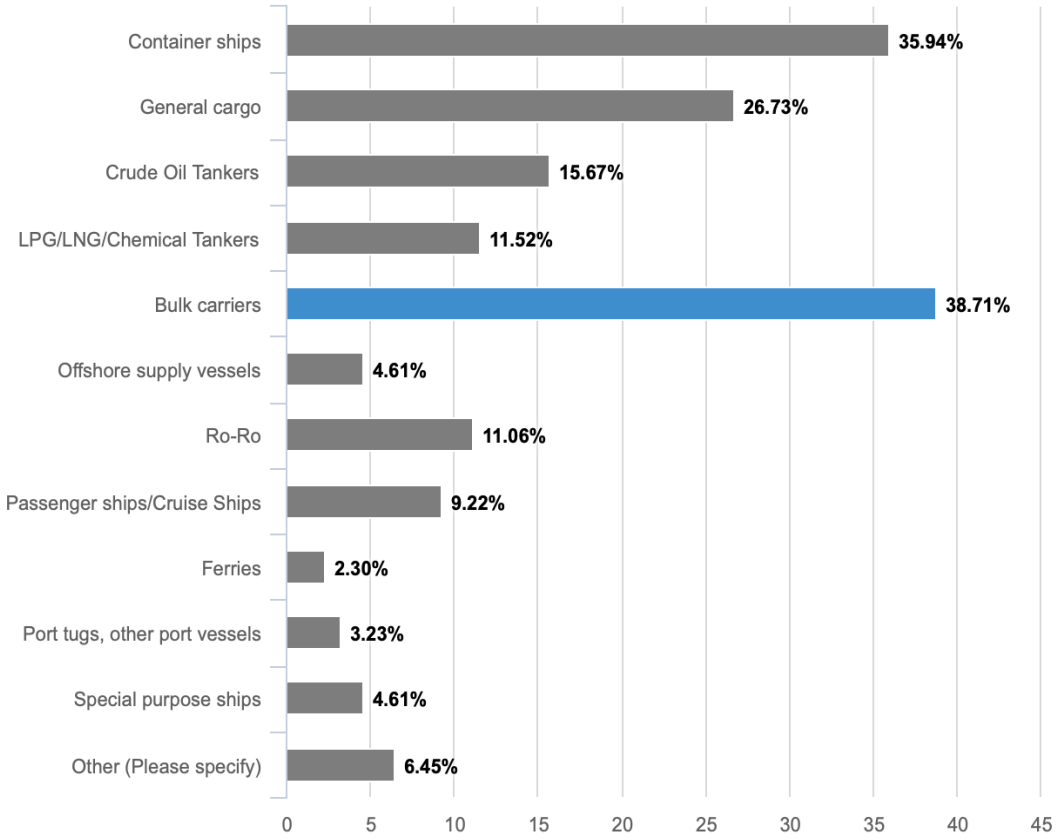
Source: Author's creation.

The majority of seafarers work primarily on bulk carriers (38.71%), container ships (35.94%), general cargo ships (26.73%), crude oil tankers (15.67%), LPG/LNG/Chemical tankers (11.57%) and Ro-Ro vessels (11.06%). The structure of

the surveyed seafarers corresponds to the composition of the international maritime labour market defined in Chapter 2, which makes the survey sample representative for the analysis.

Figure 6

Types of Vessels on Which Respondents Mainly Work

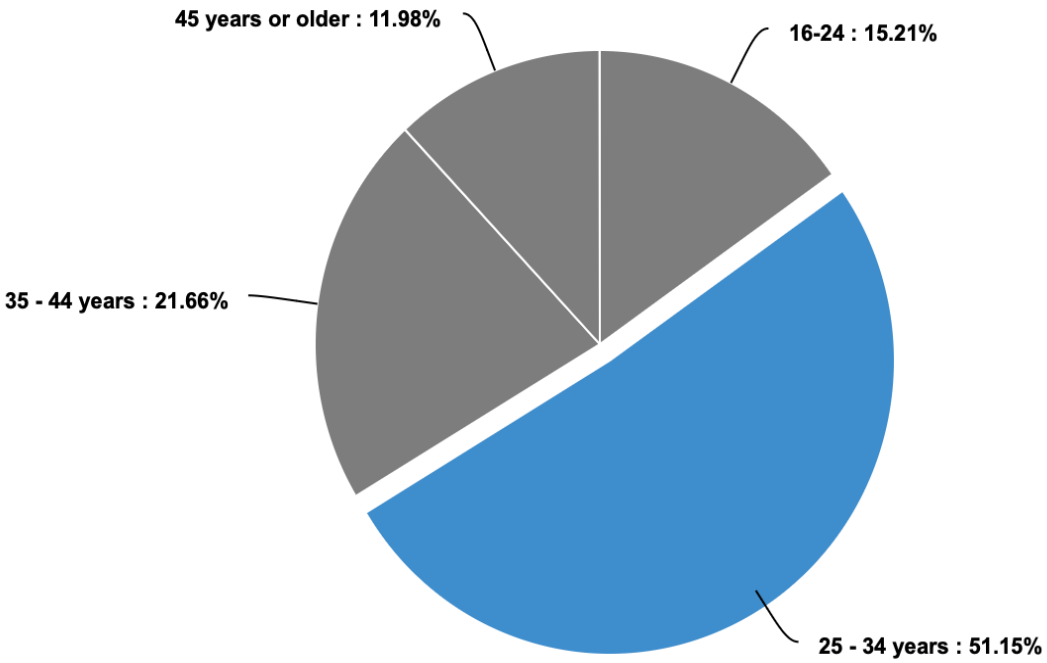


Source: Author's creation.

In terms of gender composition, men make up 94.93% of respondents, women 5.07%. More than half of the surveyed seafarers (51.15%) are in the age group of 25-34 years, followed by the age group of 35 to 44 years – 21.66% of respondents, 16-24 years – 15.21% of seafarers. Seafarers over 45 years of age accounted for 11.98%.

Figure 7

Age Distribution of Respondents

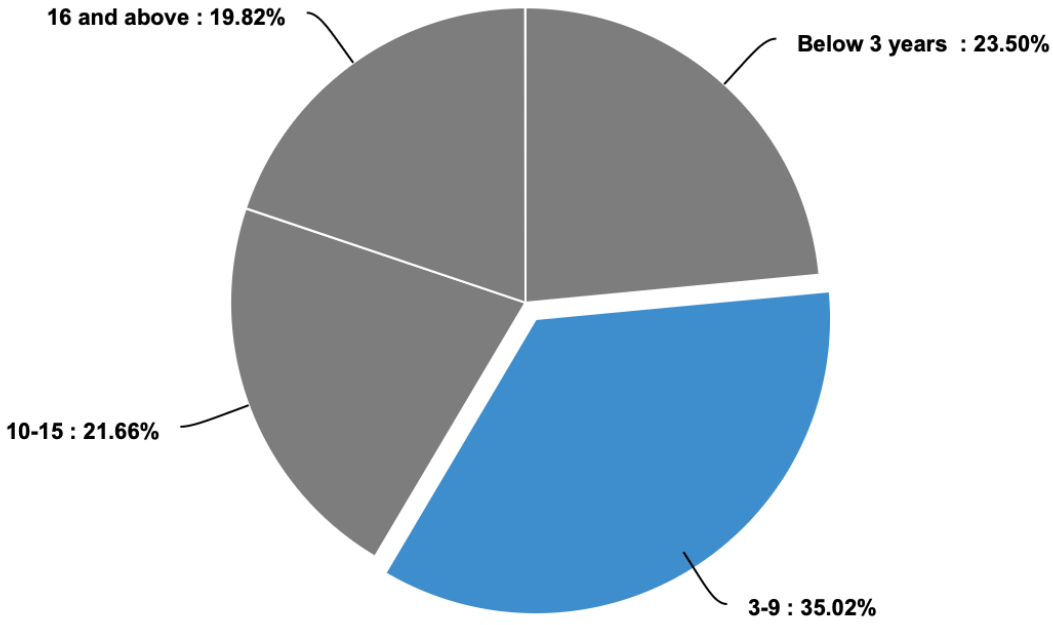


Source: Author's creation.

More than a third of the surveyed seafarers (35.02%) have experience at sea lasting from 3 to 9 years, followed by the youngest seafarers with up to 3 years of experience – 23.50% of respondents. Thus, among the seafarers surveyed, the majority are at the beginning of their career path, which seems particularly important to achieve the objectives of the study in relation to assessing seafarers' understanding of their career opportunities in the maritime industry.

Figure 8

Distribution of Respondents by Seagoing Service Experience

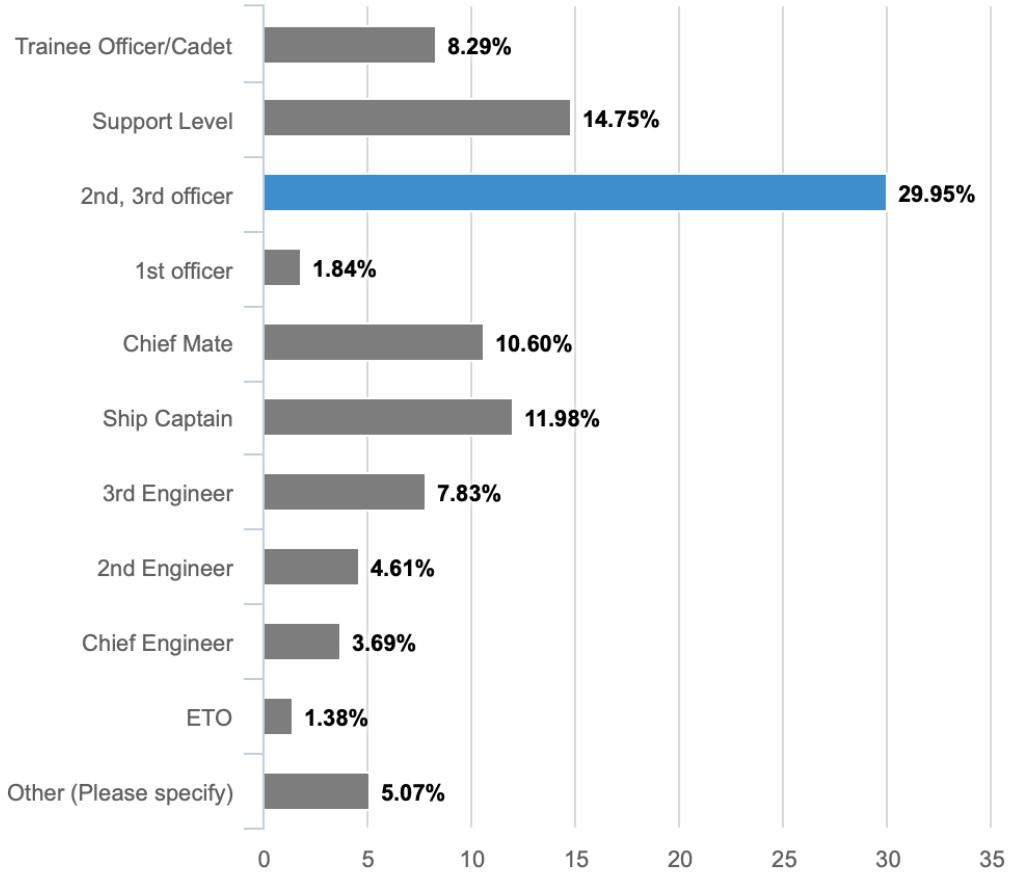


Source: Author's creation.

In terms of positions held on the ship, the majority of respondents surveyed are second or third officers (29.95%), followed by support level seafarers (14.75%).

Figure 9

Current Positions of Respondents



Source: Author's creation.

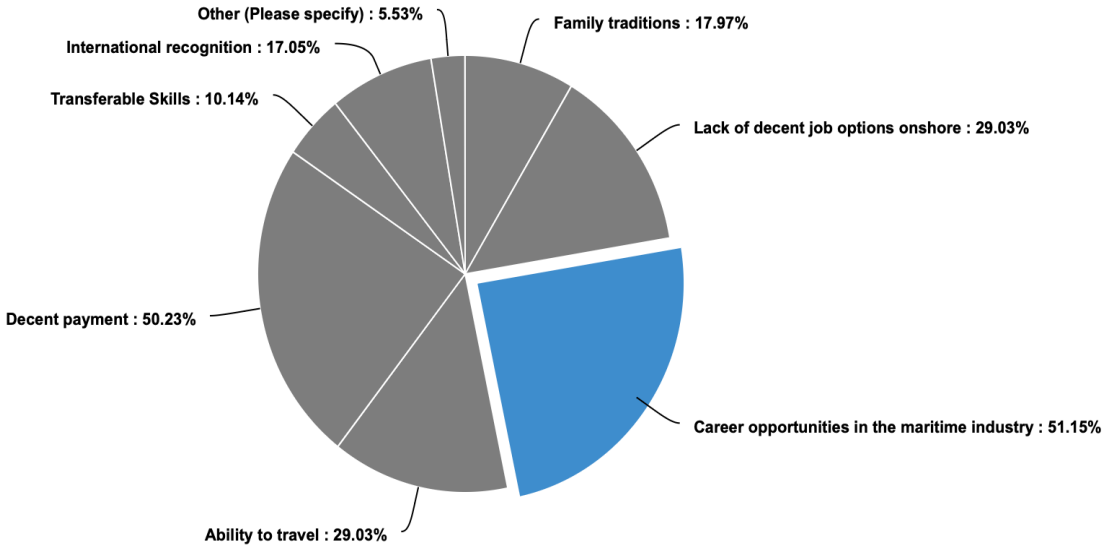
4.4. Career planning and needs of seafarers

More than half of the surveyed seafarers (51.15%) indicated career opportunities in the maritime industry as one of the reasons for choosing a seafaring profession, followed by decent pay (50.23%), lack of decent job options onshore (29.03%) and ability to travel (29.03%). At the same time, only 10.14% of respondents

indicated the possibility of acquiring transferable skills as one of the reasons for choosing the profession of a seafarer.

Figure 10

Reasons for Choosing the Seafaring Profession



Source: Author's creation.

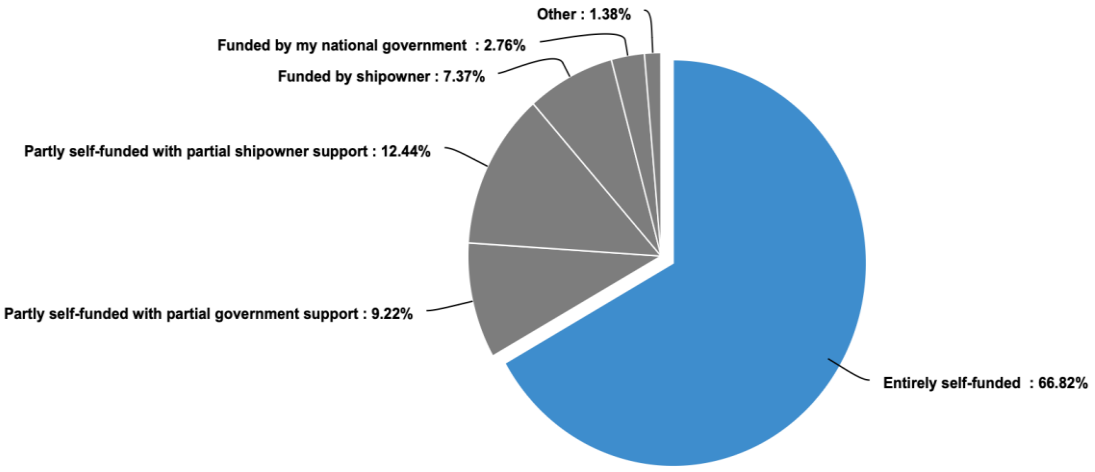
Seafarers feel a priority need for knowledge of international maritime conventions and also STCW mandatory training for the development of their careers. This knowledge and training were noted as the highest priority by 63.13% and 61.29% of the respondents, respectively. More than half of the surveyed seafarers (53.46%) noted the need to acquire soft skills for career development. Despite the fact that MLC 2006 has been in force for more than 10 years, more than 40% of seafarers still lack MLC 2006 basic knowledge and skills. The seafarers also noted the need for knowledge of commercial ship management (34.1%) and maritime commercial law (34.1%), which is important to ensure transition to work in some maritime specialties on shore. To develop their careers, seafarers also noted the need to acquire knowledge

and skills driven by decarbonization and digitalization of the shipping industry: skills to work with operational software - 37.33%, energy efficient ship operation skills - 33.18%, IT skills (artificial intelligence, IoT, cybersecurity - 28.11%, skills to work with alternative types of fuels - 24.88%, Skills in maintaining ship sensors, real-time ship monitoring systems - 24.88%.

Almost 67% seafarers surveyed indicated that they pay entirely for themselves to obtain the necessary education and training as seafarers. Only 12.44% of the seafarers receive partial assistance in obtaining the necessary training from shipowners. Shipowners fully cover training for only 16 of the requested seafarers (7.37%). The seafarers are experiencing a severe lack of support from their national governments. Only 9.22% of the seafarers received partial financial support from the state (basic education at maritime academies, which does not include mandatory STCW training, is usually covered).

Figure 11

Sources of Funding for Seafarers Education and Training



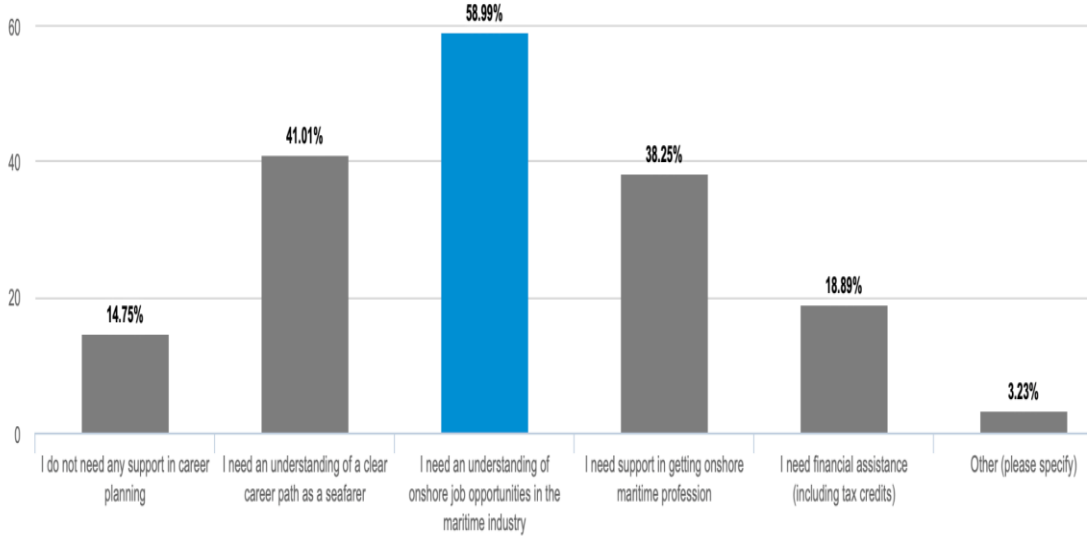
Source: Author's creation.

More than 80% of the respondents noted that they have the opportunity to obtain the knowledge and training they need in their country of permanent residence.

A need to understand shore-based job opportunities in the maritime industry is felt by 59% of the seafarers surveyed. More than 40% of the respondents (41.01%) also indicated that they lacked understanding of a clear career path as a seafarer. The need for assistance in obtaining a coastal maritime specialty was noted by 38.25% surveyed seafarers. The need for assistance in obtaining an onshore maritime profession was noted by 38.25 surveyed seafarers, while financial assistance (including tax credits) is necessary only for 18.89%.

Figure 12

Assistance Necessary for Seafarers for Career Planning



Source: Author's creation.

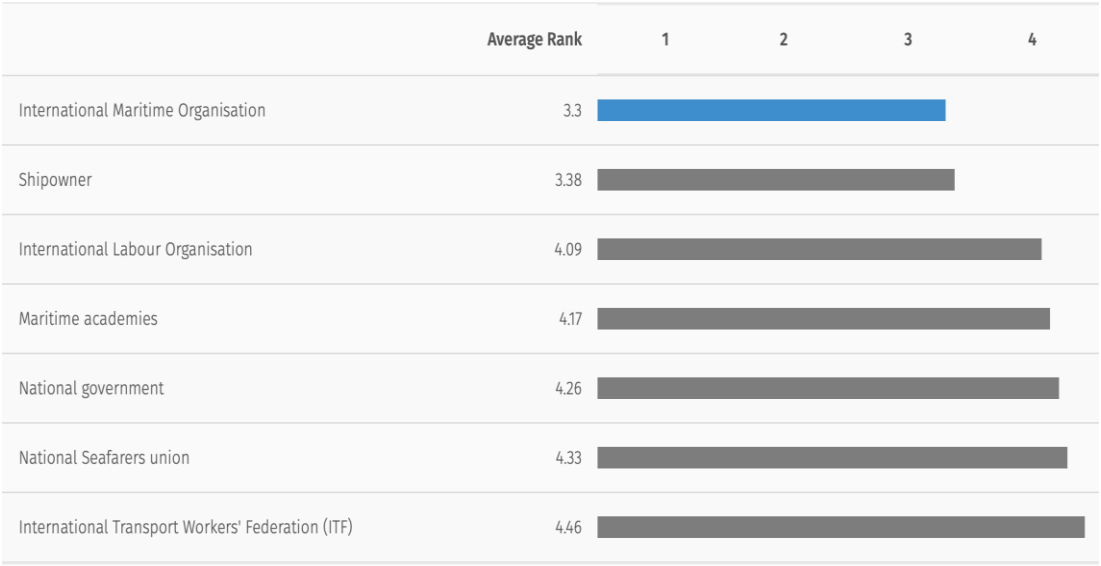
More than half of the seafarers surveyed (52.53%) noted that they did not receive any assistance in career planning. 28.11% and 19.35% of the respondents indicated that they receive career planning assistance from shipowners and/or maritime academies, respectively. At the same time, the role of national governments, national seafarers' unions and non-governmental organisations in assisting seafarers in

career planning is extremely insignificant and was noted by 12.9%, 8.29% and 4.61 the seafarers respectively.

The IMO was rated by respondents as the most authoritative organisation whose career planning advice seafarers most trust (rating 3.3), followed by shipowners with a rating of 3.38, the ILO (rating 4.09), maritime academies (4.26) and national governments (4.26). The seafarers have the lowest rating of confidence in career planning from recommendations from national trade unions and the International Transport Workers Federation, rating 4.33 and 4.46, respectively.

Figure 13

Rating of Seafarers' Trust in Career Planning Advice



Source: Author's creation.

At the same time, more than 47% of the seafarers experienced a severe lack of information about career opportunities in the maritime industry ashore. Another 18.43% of the respondents indicated that they did not search for information about onshore career opportunities. A quarter of the seafarers surveyed indicated that they

had a clear career path, and only 6.45% did not plan to continue working in the maritime industry ashore after completing their active seafaring career.

Almost 78% of the respondents noted that they fully covered costs of education and training to obtain an onshore maritime profession, which corresponds to a similar indicator for obtaining education and skills as seafarers (66.82%). Just over 6% of the respondents indicated that they received partial funding from their national maritime governments, and 5.53% received partial financial assistance from shipowners. At the same time, more than 52% of the respondents indicated that the lack of shore-based jobs in the maritime industry was their greatest concern when transitioning to shore-based jobs. Also, 38.25% of the seafarers are concerned about their lack of onshore profession, and almost 30% of the respondents noted a lack of social security protection. More than 27% of the seafarers noted psychological unpreparedness for life on shore.

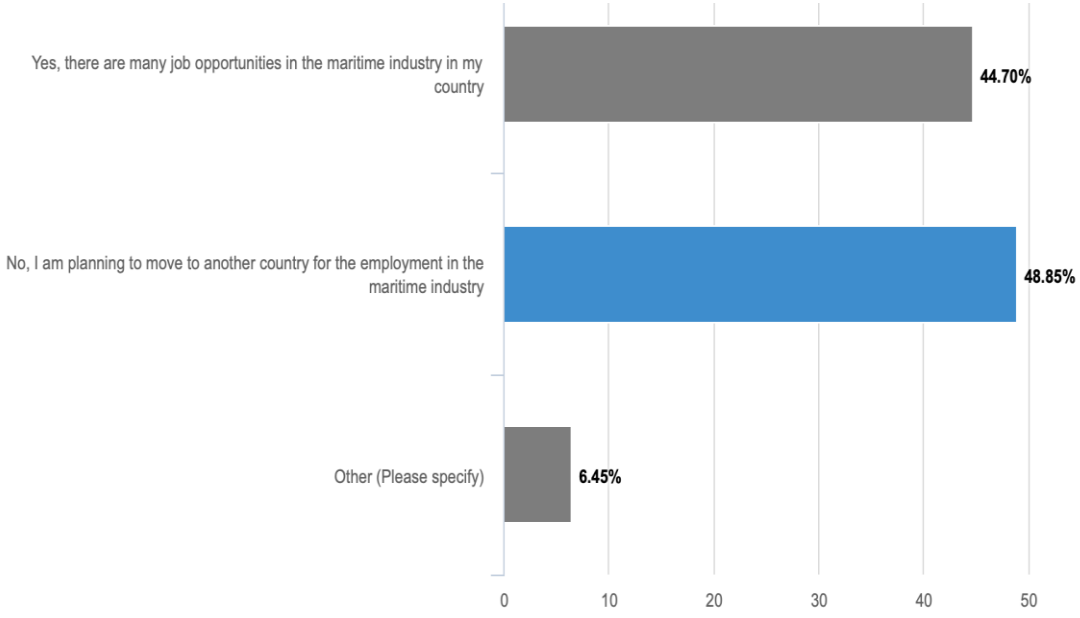
Possible health problems were noted by more than 44% of the respondents as the main reason why they might end their seafaring careers. More than 40% of the seafarers noted the negative impact of the specifics of the seafarer's profession on their family life. The high cost of STCW mandatory training and the high level of corruption in the maritime industry, were noted by more than 37% as one of the reasons for ending a seafarer's career. At the same time, despite the shortage of qualified seafarers in the international seafarer labour market, more than 30% of the respondents noted the impossibility of employment as one of the possible reasons for ending their career. Furthermore, 30% of the seafarers are ready to end their seafaring career if they have a decent job in the maritime industry on shore.

Government agencies (maritime administrations, Port State Control and others) are identified by more than 56% as priority employment sites on shore, followed by employment in the ship management, port operations sectors and technical services (marine survey, ship engineering and others). The maritime education and training sector is also attractive, which was noted by 35% of the respondents. Only 9% of the total number of seafarers surveyed have a desire to continue their careers in the

maritime industry. At the same time, almost half of the seafarers surveyed (48.85%) plan to move to other countries to find decent work in the maritime industry.

Figure 14

Employment Opportunities in the Maritime Industry Onshore in the Country of Permanent Residence of Respondents



Source: Author's creation.

4.5. Conclusions for Chapter 4

The composition of surveyed seafarers by gender balance, age, occupational category, shipping sector and nationality is representative and consistent with the structure of the international maritime labour market described in Chapter 2.

The survey confirmed that the maritime industry is attractive for employment due to its career opportunities, with the majority of the respondents experiencing an

acute lack of quality career planning in the seafaring profession and especially in the area of employment in the maritime industry onshore. The survey also confirmed that employment in the maritime industry is characterised by a high degree of labour migration. Almost half of the seafarers (the vast majority from developing countries) are planning to move to other countries in search of decent work. The data obtained from the survey is extremely useful in determining the current and future needs of the seafarer. National governments, UN agencies, shipowners, international non-governmental organisations and other maritime stakeholders must place greater emphasis on meeting the career development needs of seafarers, ensuring they have access to education and skills throughout their professional lives, and ensuring a fair transition to maritime employment industries onshore. All maritime stakeholders should also review current resource allocations to provide greater and fairer support for seafarers to access maritime education and training.

Chapter 5. Conclusion and recommendations

The maritime industry is a powerful employment generator for both seafarers and shore-based maritime professionals. The profession of seafarer is the basis for employment and career development in shipping-related sectors of the maritime industry. The structure of the international labour market for seafarers is determined by the geographical location of labour supplying states, the availability of employment opportunities within these countries in other sectors of the economy with higher or comparable income, the level of the country's GDP, the logistics accessibility of the states, age and gender distribution, as well as the characteristics of employment in different shipping sectors, requirements for additional education, training and skills for seafarers. The international maritime labour market for onshore maritime specialists is concentrated predominantly in international maritime centres - global hubs for shipping finance, management, ship services, consulting, insurance and legal services. The priority of the maritime policies of the largest maritime hubs such as Singapore and London is to create conditions for attracting and retaining the most talented maritime professionals, especially for employment in the fastest growing sector of maritime digitalization.

The international maritime labour market is characterised by a shortage of qualified personnel among both seafarers and shore-based maritime professionals, and at the same time, a high degree of labour mobility, due to uniform standards of education and training for seafarers, as well as uniform standards and job profiles for maritime professionals onshore. The lack of employment opportunities in the land-based sector of developing countries is leading to significant labour migration of the most talented and experienced maritime professionals to developed countries, which negatively affects the sustainability of the global maritime industry and widens the technology gap between different regions.

Decarbonization is one of the maritime industry's most important priorities and has a major impact on shipping employment. Seafarers and shore-based marine professionals must receive the necessary training and skills to work safely with new

fuels. The creation of decarbonized or “green” shipping corridors is uneven and concentrated primarily between ports in developed countries, especially between EU ports in the Baltic and North Seas. This could lead to greater demand for seafarers and shore-based maritime personnel with specialised skills in specific regions or shipping sectors.

The maritime industry is also, particularly, affected by technological development. Digitalization is one of the most important drivers that are significantly changing the maritime industry. The maritime digitalization market is a rapidly growing sector that is already characterised by large investments, which creates a large number of jobs. The development of the maritime digitalization sector is uneven across regions. In particular, the development of fully autonomous shipping will initially focus primarily on short sea voyages and coastal navigation, mainly between ports in developed EU countries. The majority of maritime IT companies are concentrated in North America and Western Europe (predominantly in the Scandinavian countries).

Advances in digital technology are already changing maritime job profiles and creating new benefits for onshore jobs such as shore control centre operators and offshore drone operators, as well as changing the workloads of current onshore professionals. As technology advances, new business models emerge that can have both positive and negative impacts, increasing inequality, eliminating jobs, devaluing workers' skills, and widening skills shortages. Lack of qualified personnel with maritime experience is one of the limiting factors for faster development of the maritime IT sector.

The digital evolution is rapidly changing the labour market, as well as the nature of work, education, training and skill requirements for seafarers and shore-based professionals. The requirements of the STCW Convention are already outdated and do not meet the needs of the shipping industry. Maritime professionals, in addition to hard skills, require more developed soft skills and skills in working with IT systems. The development of such skills should be included in the basic education and training program for seafarers.

Education and skills are the keys to future sustainable development Along with technical competencies, future workers must have developed soft skills such as creativity, problem solving, critical thinking and others. Employees must have clear career paths in order to be able to successfully enter the labour market, undergo retraining at the right time and successfully return to work at a higher professional level. Uneven access to modern technologies could change the industry model of education and training of maritime professionals, with seafarers from developing countries receiving basic maritime education and training in their countries of residence, and subsequent development of maritime skills being carried out by shipowners during the seafarer's professional life.

In this sense, developed countries are adapting more quickly to new technological changes, creating new business models and new jobs that require modern knowledge and skills. Uneven access to maritime finance and maritime technology as well as different standards for decarbonization of the shipping industry may lead to a widening gap between developed and developing countries, leading to a change in the composition of the international maritime labour market.

The concentration of maritime finance and shipping business in large international maritime hubs, the rapid development of maritime digitalization in developed countries, combined with uneven access of developed and developing countries to modern maritime technologies, as well as the uneven creation of “green” maritime corridors can lead to significant segmentation of international maritime labour market, both for seafarers and shore-based maritime personnel, to several regional maritime markets. Maritime professionals' access to these markets will require specialised knowledge and skills. Uneven development of maritime labour markets may increase labour migration, especially among the most talented and experienced specialists in coastal maritime transport.

Nevertheless, the maritime industry does not fully meet the needs of seafarers for clear, fair and effective career planning. Seafarers experience a severe lack of information, support and assistance from the maritime industry, both for developing a seafaring career and for transitioning to work in the maritime industry onshore.

Based on the survey results of this research, seafarers indicated that improving knowledge of international maritime conventions, as well as the need to obtain basic STCW training, are considered priorities for seafarers in developing their professional careers. Developing training and skills to meet the needs of the maritime industry, driven by decarbonization and automation requirements, is identified as important by one in three seafarers surveyed. At the same time, the education, training and skills development of maritime professionals from cadet to shore-based maritime professional is predominantly covered entirely by seafarers. The high cost of maritime education and training is one of the main factors that may cause seafarers to decide to prematurely end their active career at sea.

Seafarers indicate low levels of assistance from their national governments in planning maritime careers, both in the seafaring profession and in shore-based maritime occupations, and low assistance for seafarers to access modern maritime education, training and skills development. The IMO is the most authoritative organisation whose career planning advice is most trusted by seafarers. At the same time, the IMO's strategic priorities in relation to the human element are focused on ensuring the safety of shipping, without paying the necessary attention to developing the career skills of seafarers and ensuring fair career planning during the transition to work ashore. The ITF and national maritime unions have the lowest level of confidence for career planning among seafarers.

The vast majority of seafarers identify employment in the maritime industry as their priority for working onshore after completing an active career at sea. At the same time, lack of onshore maritime profession is one of the factors that causes the greatest concern for almost 40% of the surveyed seafarers when moving from ship to shore to work. More than half of the seafarers surveyed noted a lack of jobs in the maritime industry onshore in their countries of citizenship, which would force them to move to other countries in search of decent work.

The maritime industry must significantly increase its efforts to attract and retain the most talented young men and women in the maritime industry. Maritime professionals must be provided with the clearest career paths from cadets to shore-

based maritime professionals, as well as assistance in acquiring the necessary knowledge and skills throughout their professional development. The maritime industry must strive to ensure equal access for seafarers and maritime professionals to modern maritime education and technology to reduce the gap in technological development between developing and developed countries.

All maritime stakeholders face the difficult task of overcoming the shortage of qualified maritime professionals. Ensuring investment in maritime human capital should become a top priority for the maritime industry. In this regard, it is important to ensure equal and fair access for seafarers and maritime professionals of all nationalities to modern knowledge, education and technology. This requires the development of coordinated maritime employment policies and programs at the international, regional and national levels. Governments need to act now to remove structural barriers to growth, improve the resilience of the maritime industry and help seafarers adapt to new challenges.

Recommendations

Based on the above research study and the results of the survey distributed among seafarers and stakeholders for the purpose of this research, some recommendations can be made:

To ensure equitable career planning for seafarers and to meet the global maritime industry's current and future needs for skilled maritime professionals both onboard and onshore, a people-centred approach must be the basis for the development of international and national maritime policies and strategic development plans. Maritime human resources must be regularly assessed to ensure that the priority shipping sectors' needs for qualified and motivated professionals are met.

Availability of maritime education and training for seafarers and maritime specialists on shore must be ensured. Comprehensive review of STCW competency standards should be provided, taking into account the need to introduce new

technologies into maritime education, as well as the need for seafarers to acquire new soft skills and transferable skills to ensure a fair transition to work in the maritime industry onshore. Modern educational technologies, including virtual and augmented reality technologies should be introduced at the stage of basic maritime education.

Seafarers should be provided with detailed career plans and information about employment opportunities in the maritime industry ashore. Programs and schemes for government support for employment in the maritime industry should be implemented, including measures to ensure constant motivation of seafarers for continuous learning and development of soft skills. National governments and shipowners should provide financial assistance and support for seafaring and offshore skills. It is necessary to attract various sources of investment in the sector of maritime education and development of maritime personnel.

The IMO, ILO, together with national governments, shipowners' associations and maritime trade unions must take joint action to overcome the inequalities between developed and developing countries. Developing countries should be supported to access modern maritime technologies for integration into seafarer education and training. To achieve this, technical cooperation programs between developed and developing countries must be actively implemented. There is also a need to develop the institutional capacity of maritime administrations, maritime academies and maritime training providers in developing countries.

A methodology for assessing a country’s national maritime workforce should be developed taking into account the country’s maritime profile, its maritime development priorities, as well as the high degree of labour mobility of maritime specialists both among seafarers and among maritime specialists on shore. Countries should be provided with technical assistance in assessing and developing their national maritime human resources and developing national policies to promote maritime employment. It is necessary to develop the institutional capacity of maritime stakeholders, including national maritime unions of seafarers.

All national maritime stakeholders should be actively involved in developing clear career plans for seafarers and shore-based maritime professionals ashore to equip

seafarers with the necessary knowledge and skills. Regular dialogue between all interested stakeholders, as well as promotional campaigns to attract the most talented young men and women into the maritime industry, are necessary to ensure that the maritime industry has the required number of motivated seafarers and maritime professionals. The most effective methods of motivating seafarers and coastal maritime transport professionals to participate in lifelong learning and career development need to be identified and promoted. All stakeholders should cooperate to eliminate the causes of threats that could lead to early termination of the active professional career of seafarers and maritime specialists.

Scope for future research

Existing methodologies for assessing employment in state sectors of the economy can be of limited use for assessing a country's maritime human resources, taking into account the global nature of international maritime shipping, high labour mobility in the maritime industry and the significant gap between states in access to modern maritime technologies, maritime finance and other resources. It is necessary to develop a methodology for assessing and developing the country's national maritime human resources to ensure a people-centred approach in the development of national maritime policies and strategies.

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Appendices

Appendix 1: Ethics considerations

Sample of consent form

Dear Participant,

Thank you for agreeing to participate in this research survey, which is carried out in connection with a Dissertation which will be written by the interviewer, in partial fulfilment of the requirements for the degree of Master of Science in Maritime Affairs at the World Maritime University in Malmo, Sweden.

The topic of the Dissertation is "**Just transition career planning for seafarers: challenges and opportunities for sustainable shipping"**

The information provided by you in this survey will be used for research purposes and the results will form part of a dissertation, which will later be published online in WMU's digital repository (maritime commons) subject to final approval of the University and made available to the public. Your personal information will not be published. You may withdraw from the research at any time, and your personal data will be immediately deleted.

Anonymised research data will be archived on a secure virtual drive linked to a World Maritime University email address. All the data will be deleted as soon as the degree is awarded.

Your participation in the survey is highly appreciated.

Student's name	Sergii Kazantsev
Specialization	Maritime Law and Policy
Email address	w1008836@wmu.se

* * *

I consent to my personal data, as outlined above, being used for this study. I understand that all personal data relating to participants is held and processed in the strictest confidence, and will be deleted at the end of the researcher's enrolment.