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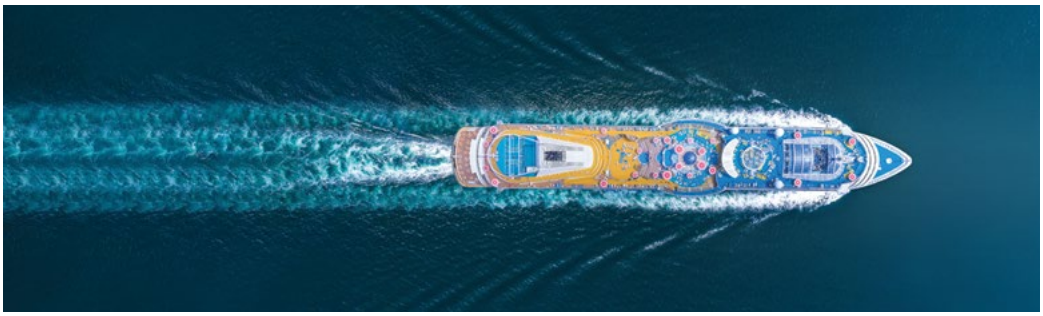
ADVANCING THE POTENTIAL OF SUSTAINABLE OCEAN-BASED ECONOMIES: TRADE TRENDS, MARKET DRIVERS AND MARKET ACCESS

A FIRST ASSESSMENT



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Abbreviations and acronyms

CAGR	compound annual growth rate
CPC	Central Product Classification (of the United Nations)
FDI	foreign direct investment
FAO	Food and Agriculture Organization of the United Nations
GHG	greenhouse gases
HS	Harmonized Commodity Description and Coding Systems
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
IUU	illegal, unreported and unregulated (fishing)
MAST	Multi-Agency Support Team
NTMs	non-tariff measures
n.e.c.	not elsewhere classified
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
SAR	Special Administrative Region (of China)
SDGs	Sustainable Development Goals
SOEC	Sustainable Ocean-based Economies Classification (of UNCTAD)
UNCTAD	United Nations Conference on Trade and Development
WITS	World Integrated Trade Solution
WTO	World Trade Organization
WTTC	World Travel & Tourism Council

Executive summary

Over the past decades, the challenges facing the world have intensified at a speed that puts our oceans and the people and economies that rely on them in peril. Overfishing and chemical and plastic pollution have resulted in species extinctions, variations in the biomass levels of the oceans, and the degradation of ecosystems, leading to the loss of half of all living corals (United Nations, 2020a). In addition, the impact of climate change has led to a rise in sea levels, ocean temperatures, ocean acidification, de-oxygenation, shifts in fish distribution, decrease in fish stocks, coastal erosion and extreme weather events (UNCTAD, 2019a).

Oceans are home to 80 per cent of the world's biota and their ecosystems have a higher diversity of living organisms than terrestrial ecosystems (Suleria et al., 2015). The Sustainable Ocean-based Economies Classification (SOEC) prepared by the United Nations Conference on Trade and Development (UNCTAD) identifies 100 clusters (from over 780 industries) of goods, services and energy industries that are dependent on the oceans.

Although all ocean-based industries are traded, little is known about these industries in the context of the blue economy, the size and trends of the trade flows, market access challenges and opportunities, or the supply side gap. Even less is known about the interplay between trade and the interconnectivity and complexity of the sectors. Their impact on oceans ecosystems is also largely unknown. Likewise, information on social issues such as vulnerable communities, or the prevalence of gender inequality, is also lacking for most ocean-based industries.

This report is a first step towards filling the knowledge gap about sustainable ocean economies. It provides a base for further research and analysis and sets qualitative and quantitative baselines for comparison and understanding. Using UNCTAD's SOEC, the report examines trade data availability, describes the industries that are part of the classification, takes stock of export trends, analyses the market drivers of these industries, and evaluates market access through an analysis of tariff and non-tariff barriers to trade.

The report finds that at the global level, trade data are available for only 61 of 100 ocean-based industry clusters. Filling this data gap will be crucial to better identify and address the challenges and opportunities of the oceans economy. The findings show that aggregated sector values hide very important differences between subsectors, regions and countries in terms of trade trends. Available data show that in 2018, the export value of the 61 ocean-based industry clusters was $2 516 billion (about $2.5 trillion). The export value of ocean-based goods in 2018 is estimated to be $997 billion (about $1 trillion), while the export value of ocean-based services is estimated to be $1 520 billion (about $1.5 trillion). These values are conservative, not only because of a lack of data on certain industry clusters, but also because the available data do not include all products that form part of the 61 industry clusters. The report only measures tradable ocean-based goods and certain services, while recognizing that the overall value of ocean assets is much higher (WWF, 2015) – and that oceans by themselves are priceless. The largest sectors in terms of export value were tourism ($1 121 billion), high-technology and other manufactured goods ($595 billion) and maritime transport and related services ($399 billion).

At the country level, in most subsectors, an increasing number of countries are trading less traditional industries such as seafood processed by-products, sport boats, cosmetics, etc. The level of disaggregation and information about market drivers also reveal that leading countries are venturing into new products and developing value chains. As for market access measures

in ocean-based goods, the analysis reveals the growing relevance of non-tariff requirements, particularly sanitary and phytosanitary requirements (SPS) and technical barriers to trade (TBT). These measures have important health and environmental benefits, but they can also undermine the participation of low and middle-income countries in global trade due to inadequate infrastructure, limited financial resources, or lack of knowledge.

The COVID-19 pandemic has shown the fragility of the global economy, revealed the critical role of product and market diversification, and the importance of sustainability. This report considers that there will be an uneven downwards trend and significant uncertainty in most oceans economy sectors because of the COVID-19 pandemic and its impact on exports, but it does not attempt calculations or analysis beyond 2018 because its purpose is to provide a quantitative baseline and an initial sectoral overview. Also, many of the impacts of COVID-19 may not yet be fully captured by international datasets because of lags in reporting.

Finally, the report identifies regional and international cooperation as essential to fill data gaps, democratize access to and development of technologies, and promote regulatory harmonization and transparency. These, together with advocacy and building national capacities, are critical to cope with the challenge of a sustainable oceans economy.

1. UNDERSTANDING THE OCEANS ECONOMY

Oceans and seas cover seventy per cent of the Earth's surface and account for about 97 per cent of the planet's water (National Ocean Service, 2020). They are home to 80 per cent of the world's biota, and their ecosystems have a higher diversity of living organisms than terrestrial ecosystems do (Suleria et al., 2015). Oceans play a dual role. On the one hand, they contribute to over 50 per cent of the oxygen in the Earth's atmosphere, absorb half of global carbon emissions, help to mitigate the impact of climate change and determine weather patterns, temperatures and the water cycle (UNOC, 2020). On the other hand, oceans provide numerous resources for human nutrition, health and economic development. UNCTAD's SOEC identifies 100 clusters (from more than 780 industries) of goods, services and energy industries that would not exist without the oceans. The classification includes industries that take place in/on the oceans; goods and services produced by activities based on land but that depend on inputs provided by the oceans; and activities located on land that produce goods and services for ocean-based activities, i.e., industries directly linked to the ocean through a supply chain.

Ocean-based economies are usually thought to include industries such as fisheries, tourism and maritime transport, but a plethora of ocean-based industries has developed over the past decade – notably based on goods and services related to high technology and innovation. UNCTAD's SOEC provides a comprehensive mapping of all industries that are part of sustainable ocean economies. The classification builds on existing national and regional ocean classifications and is structured around three categories: goods, services and energy. Each category is divided into sectors (A to M) and each sector is further sub-divided into a three-digit level of detail covering a total of 52 subsectors, which together make 100 industry clusters. The classification only includes tradable sectors,[1] namely:

A. Marine fisheries
B. Aquaculture and hatcheries
C. Seafood processing
D. Sea minerals
E. Ships, port equipment and parts thereof
F. High-technology and other manufactures not elsewhere classified (n.e.c.)
G. Marine and coastal tourism
H. Trade in fisheries services
I. Maritime transport and related services
J. Port services, related infrastructure services and logistical services
K. Coastal and marine environmental services
L. Marine research and development and related services
M. Ocean energy & renewable energy.

[1] UNCTAD's SOEC excludes services provided by the oceans, e.g. ecosystem services such as clean water and air, because including them implies a different accounting system that goes beyond economic activities in the strict sense.

Ocean-based industries can have a positive or negative impact on ecosystems. Data on the state of oceans are alarming: overfishing (about 34.2 per cent of all fish stocks are at unsustainable biological levels [FAO, 2020]), and chemical and plastic pollution (which continues entering the ocean at an alarming rate)[2] have resulted in species extinctions, variations in the biomass levels of the oceans, and the degradation of ecosystems, leading to the loss of half of all living corals (United Nations, 2020a). In addition, the impact of climate change on oceans has led to a rise in sea levels, ocean temperatures, ocean acidification, de-oxygenation, shifts in fish distribution, a decrease in fish stocks, coastal erosion, and extreme weather events (UNCTAD, 2019a). Such trends are already directly and indirectly harming ocean-based economic sectors.

The challenge is particularly severe for developing countries where ocean-based sectors have often expanded without due consideration of their adverse impacts on environmental and social sustainability. Most of these countries are not equipped to handle the challenges before them (OECD, 2019). In particular, small island developing states and least developed countries (LDCs) find themselves bearing the brunt of the negative impacts of climate change and ocean pollution (UNCTAD, 2019a).

It is well established that failing to implement cohesive corrective actions to preserve oceans at the national, regional and global level will harm ocean ecosystems and put human health, well-being, jobs and economies at risk. The intrinsic relationship between oceans and economies and trade is recognized in the United Nations Sustainable Development Goal (SDG) 14, and the critical role of international cooperation in SDG 17 (see Box 1). The urgency to act against unsustainable practices is also part of the Nairobi Maafikiano, paragraph 100 (t), which calls on UNCTAD to work:

> "[i]n cooperation with other relevant international organizations and other stakeholders, support developing countries, in particular small island developing States, in the advancement of Sustainable Development Goal 14 in the design and implementation of regional and/or national economic development strategies for the conservation and sustainable use of oceans and their resources, seeking to promote sustainable trade in ocean-based sectors (…)" (UNCTAD, 2016a).

To meet the SDG 14 targets and foster the sustainable growth of ocean-based sectors in developing countries, a holistic evaluation of the present situation is urgently needed, with a focus not only on the sustainable use and management of marine and coastal ecosystems,[3] but also on the production patterns and trade trends of ocean-based sectors (UNCTAD, 2021, 2019a; OECD, 2019).

[2] Every year at least eight million tons of plastic end up in the ocean, accounting for up to 80 per cent of all marine debris, from surface waters to deep-sea sediments (IUCN, 2021).

[3] See United Nations' First World Ocean Assessment at https://www.un.org/regularprocess/content/first-world-ocean-assessment.

Box 1. Oceans and trade-related Sustainable Development Goals and targets

SDG 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

14.4. By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

14.6. By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organisation (WTO) fisheries subsidies negotiation.

14.7. By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.

14.A Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries.

14.B Provide access for small-scale artisanal fishers to marine resources and markets.

SDG 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Most actions undertaken for measuring the oceans economy concentrate on integrating it into countries' national accounts.[4] However, the system of national accounts is an imperfect fit for mapping or tracking oceans economies because it does not allow for the disaggregation of data between exports, imports and production for national consumption at a product level. Further, the International Standard Industrial Classification (ISIC), does not always permit the untangling of ocean-based industries from other industries. Another knowledge gap concerns the adoption and international harmonization of oceans industries' satellite accounts: not all coastal countries have created an ISIC satellite account, and existing satellite accounts are not directly comparable across countries (except European Union countries, which share the same oceans classification) (UNCTAD, 2021).

Despite measurement efforts, little information exists about the value of the oceans economy at the global level, particularly on trade flows. Trade is an enabling factor in climate mitigation and adaptation. It allows for the mainstreaming of goods and services necessary for the sustainable development of ocean-based economies and ocean ecosystems (UNEP, 2018). For instance, it can be an important determinant of access to environmentally friendly or preferable goods and

[4] Some international forums working on this are the World Resource Initiative (see https://www.wri.org/blog/2020/07/ocean-national-accounts) and the World Ocean Initiative (see https://www.woi.economist.com/why-the-world-ocean-summit-is-going-to-japan-in-2020/).

services.[5] The potential of ocean-based sectors for growth is high and trade can serve as a driver to such growth. Developing these markets is particularly important for developing nations where local economies remain small and must cope with remoteness. As it is well known, if the necessary policy and business frameworks are in place, trade can pave the way for commercial ventures that can create new economic opportunities which may expand rapidly due to global economic interconnectedness. Furthermore, with the expansion of services and technological advances, all businesses (small or large) can improve their capacity to access international markets. For instance, in Madagascar, seaweed farming has become a sustainable source of income for former fishers and rural women who are able to sell their seaweed products to foreign markets (UNEP, 2019a).

In spite of the fact that virtually all ocean-based industries are being traded, their impact on the ocean's ecosystems is largely unknown – notably concerning the sustainable use, management and governance of the oceans. Similarly, little is known about market access challenges and opportunities in ocean-based sectors, or the supply side gap. Regulatory measures and public and private standards are becoming increasingly prominent – mainly for sanitary, phytosanitary and environmental reasons. Small-scale producers or fishers may not be able to harness the export potential of ocean-based industries because of a lack of resources or knowledge to meet these regulations. Furthermore, there is limited knowledge about the interplay between trade and the interconnectivity and complexity of the ocean-based sectors. Likewise, information on social issues, such as vulnerable communities or the prevalence of gender inequality, is also largely unknown for most ocean-based industries. The sustainability of ocean-based economies from a trade perspective has chiefly been explored through a limited set of traditional sectors, namely fisheries, tourism or maritime transport.[6] Only scattered information (mainly from case studies) is available for other sectors. In the past, gathering information proved to be particularly difficult because there was not a harmonized international classification that maps all sectors that are directly relevant to the ocean-based economies from a trade perspective or through a value chain outlook.

UNCTAD's SOEC is an important step towards filling this knowledge gap. It provides a framework and facilitates the study of industries that form part of ocean-based economies. Collecting and assessing data are critical for taking effective and inclusive decisions about ocean resources management and building sustainable ocean economies that can deliver on the 2030 Agenda for Sustainable Development. The COVID-19 crisis has made the need for data even more pressing. Data and knowledge give voice to industries, open the way for collaboration between industries and the public sector, and can stimulate greater levels of foreign direct investment (FDI). Data on ocean-based industries are also fundamental for governments to take evidence-based decisions concerning resources, assess impacts and devise measures to stimulate and regulate the growth of sustainable sectors that have the potential to lead to economic recovery and job creation.

This report uses UNCTAD's SOEC to take stock of trade data availability and data constraints, and enhance understanding of ocean-based sector development from a trade perspective. It sheds light on global and regional trade trends, leading exporters, market drivers and market access conditions faced by sectors and subsectors for which data are available. The aim of the report is to raise awareness among policymakers and the international community about the opportunities and challenges offered by ocean-based sectors which can become pillars of growth – or sources of stress and high cost – for the oceans, depending on countries' development paths.

The remainder of this report is organized as follows: Section 2 presents the theoretical framework of UNCTAD's harmonized international SOEC and introduces a preliminary overview of market access measures applied to goods[7]. This Section then assesses trade data availability and offers

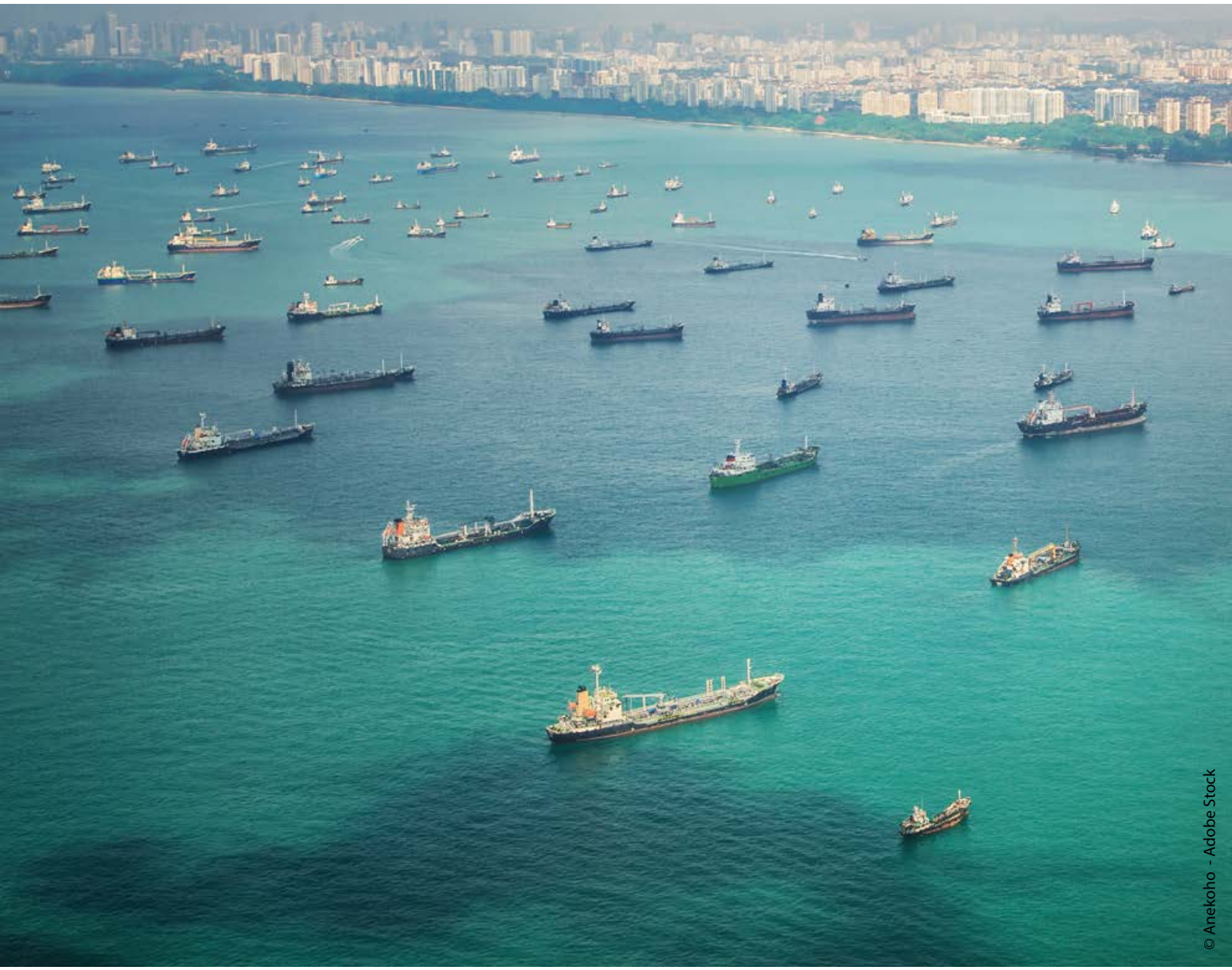
[5] UNCTAD has applied the concept of preferable environmental products (EPPs) since the early stage of the environmental goods and services debate. EPPs are usually defined as products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. (UNCTAD, 1995).

[6] See, for instance, Keane et al. (2020).

[7] See UNCTAD (2021) for the description of UNCTAD's SOEC.

a global overview of UNCTAD's sustainable ocean-based export trends of goods and services for which data are available. In the case of trade in goods, Section 2 goes a step forward and delves into market access measures (tariffs and non-tariff requirements) which are becoming increasingly prominent and are critical determinants of international trade. Because of a lack of data on trade flows, the section only presents the characteristics of the ocean-based energy sector and discusses current market trends in the energy subsectors for which data are available.

Section 3 presents the profiles of the all SOEC sectors and subsectors for which data on trade and market drivers are available. Global values mask significant differences in trends and patterns across subsectors and countries. The sector data are complemented with information about market drivers and, in the case of goods, market access. The trade trends assessment presents data at different levels of aggregation: sector, subsector and country. The methodology utilized for the calculation of trade trends is discussed in Annex 1. Based on the lessons learned, Section 4 takes stock of approaches for the development of countries' ocean-based economies. Section 5 concludes with recommendations on the way forward, considering the COVID-19 pandemic.



2. GLOBAL OVERVIEW OF SUSTAINABLE OCEAN-BASED SECTORS – TRADE TRENDS, DRIVERS AND MARKET ACCESS

2.1 Analytical framework: UNCTAD's Sustainable Oceans Economy Classification

UNCTAD's SOEC is consistent with United Nations agencies and the World Bank's definition of a "sustainable oceans economy." The terms "sustainable ocean-based economies"[8] and "blue economies"[9] should therefore be understood to encompass all industries that utilize and contribute to the conservation of oceans, seas and coastal resources for human benefit in a manner that sustains all ocean resources over time.[10] There is widespread consensus in the literature that an ocean-based economy must ensure sustainable use and conservation of the ocean-based marine environment, related biodiversity, ecosystems, species and genetic resources, including marine living organisms (from fish and algae to micro-organisms) and natural resources in the seabed.[11] Reports also recognize the interdependencies that exist between ocean-based industries and marine ecosystems.[12] Most definitions of the oceans economy include economic activities that support the functioning of the oceans' economic sectors, which can be located in landlocked countries.[13]

In line with the above definitions, UNCTAD's SOEC only includes tradable[14] goods and services which pose a low or moderate environmental risk. As such, industries which are known to cause a high risk to the environment are excluded. Similarly, sectors that could have a negative impact on human, animal, or plant health – for which developing countries have little practical and regulatory experience – are also excluded. Industries with high risk of environmental harm, not included in the classification, can be grouped as follow: offshore oil and gas; deep and ultra-deep water oil and gas; marine and seabed mining; and support activities for oil and gas operations (UNCTAD, 2009). Furthermore, services provided by government authorities and other public services in exercise of governmental authority, e.g., services provided by customs officers or coastguard legal enforcement, are not part of the classification.

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8 The term "sustainable ocean-based economies" is used in the 2020 United Nations Oceans Conference (United Nations, 2020b).

9 The term "blue economy" may not be used identically across the world. For instance, the United Nations Economic Commission for Africa's definition includes oceans as well as lakes, rivers and other bodies of water. See https://archive.uneca.org/publications/blue-economy.

10 See, for example, United Nations, 2020a; UNCTAD, 2019a, 2018; UNDP, 2018; World Bank and UNDESA, 2017.

11 UNOC, 2020; UNCTAD, 2019a; OECD, 2019, 2016.

12 Some countries and organizations, such as the OECD are trying to assess the value of oceans. The OECD defines the oceans economy as the sum of the economic activities of ocean-based industries, together with the assets, goods and services provided by marine ecosystems, and recognizes the interdependency of those two pillars (OECD, 2016).

13 See, for instance, UNCTAD, 2018; OECD, 2016; Colgan, 2016.

14 UNCTAD's SOEC excludes services provided by the oceans, i.e., ecosystems services such as clean water and air, because including them implies a different accounting system that goes beyond economic activities in a strict sense.

Within the above framework, UNCTAD's SOEC provides the most comprehensive mapping of ocean-based industries and allows the study of global trade trends. The classification is based on international classifications that provide the highest level of disaggregation and that are usually applied to collect and analyse trade data and for policy purpose (e.g., trade negotiations). The SOEC for goods builds on the Harmonized System (HS) classification, while the SOEC for services depends on the CPC, W/120 and the BPM/EBOPS[15] classifications (UNCTAD, 2021). As for the energy sector, the SOEC uses the CPC codes (services) and HS codes (goods) because energy has characteristics of both a good and a service.[16] The SOEC can be used to conduct economic assessment and as a tool for trade policy and trade agreements negotiations. Table 1 provides SOEC structure at level 1 of disaggregation. The detailed classification, including international codes for products and services at the most disaggregated level (i.e., HS, CPC, W/120 and BPM/EBOPS) can be found in UNCTAD (2021).

A commonly recognized hurdle in any analysis of goods and services trade data is the level of aggregation of international classifications, not least for HS and the BPM/EBOPS, which are the product/services codes of the SOEC. Products and services codes usually do not distinguish between land-based and ocean-based industries, and in many cases several industries are grouped under a single code. In the case of goods, this problem can be partially solved by national tariff line codes as almost all countries create sub-categories to existing international classifications, but this is not possible at the global level because tariff line codes can differ across countries. Owing to the partial coverage of international classifications for certain industries, a coefficient was calculated using studies on the size of subsectors. The methodology applied for estimating the coefficients, and further information on the characteristics of HS and the BPM/EBOPS classification, are presented in Annex 1.

Efforts were made to obtain data for all mapped sustainable ocean-based industries, including industries not using the HS or the BPM/EOPS classification. Yet for many industries, notably in the service and energy categories, it was not always possible to collect trade flows data. In certain cases, it was not possible to untangle ocean-related activities from other activities due to the limited information on the industry. In others cases the number of countries covered in databases did not include industries' major economies or the number of countries was too low. Table 1 presents the list of sustainable ocean-based economy sectors that are part of this report and those that are not. Trade data on Aquaculture and hatcheries (Sector B) are included in the data on Marine fisheries because HS codes do not differentiate between production methods. Given data limitations, the quantitative analysis presented in the report must be assessed with caution. As for the unrepresented sectors, it is important to fill those data gaps.

[15] CPC stands for United Nations Central Product Classification. W/120 is the official classification used in 1991 in the framework of the World Trade Organization's (WTO's) negotiations on services. BPM/EBOPS is the Extended Balance of Payments Services (EBOPS) classification, which builds on the Balance of Payment Manual (BPM).

[16] For more on energy definition see "The WTO in the emerging energy governance debate": https://www.wto.org/english/res_e/publications_e/wtr10_forum_e/wtr10_marceau_e.htm.

Table 1. UNCTAD's sustainable ocean-based subsectors (level 1) according to trade data availability (full, partial, and not available)

Goods		
SOEC code	SOEC description	Data availability
A1	Finfish	full
A2	Crustaceans	full
A3	Molluscs	full
A4	Aquatic invertebrates other than crustaceans	full
A5	Other living marine products	full
C1	Prepared and preserved fish, crustaceans and molluscs	full
C2	Flours, meals and pellets, of fish or crustaceans, molluscs, or other aquatic invertebrates	full
C3	Fats and oils of fish or marine mammals, whether or not refined	full
C4	Processed meals and dishes	partial
D1	Sea salt	full
D2	Natural sea sand	full
E1	Vessels	full
E2	Parts of vessels and inputs supporting navigation and ports	partial
F1	Manufactures for the fishing and aquaculture industries (excludes vessels and parts thereof)	partial
F2	High technology manufacture for environmental sustainability and clean energy	partial
F3	Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment	partial
F4	Manufacture of coastal and marine sport goods, textile articles (except apparel) and other materials	partial
F5	Other electrical equipment, machinery and appliances for other marine industries	partial
Energy		
M1	Offshore wind energy	not available (NA)
M2	Tidal power	NA
M3	Wave power	NA
M4	Submarine geothermal energy	NA
M5	Chemical potential of seawater	NA
M6	Marine biomass-based biofuels	NA
M7	Power plants/projects	NA
Services		
G1	Hotels and restaurants (incl. catering)	full
G2	Travel agencies and tour operator services	full
G3	Tourist guide services	full
G4	Recreational and other services	full
H1	Services incidental to fishing and aquaculture	NA
H2	Fish and seafood processing and packaging	NA
H3	Commercialization and distribution of fish and other marine products	NA
I1	Passenger transportation	partial
I2	Freight transportation	partial
I3	Auxiliary services to maritime transport	partial
I4	Marine insurance and finance	partial
J1	Port and harbour operations, including marine cargo handling	NA
J2	IT, and other automated services for ports facilities	NA
J3	Warehousing and storage	NA
J4	Navigational services on coastal and transoceanic waters	NA
J5	Marine-related engineering and construction	NA
K1	Sewage services	NA
K2	Waste treatment and disposal services located by the coast	NA
K3	Containment, control and monitoring services, and other site remediation services n.e.c.	NA
K4	Coastal and oceans habitat protection, preservation and restoration	NA
K5	Other environmental protection services	NA
L1	Research and development (R&D) services and related education	NA
L2	Interdisciplinary R&D services on environment, oceanography and the like	NA
L3	Technical testing and analysis services	NA
L4	Scientific and technical consulting services	NA

Source: UNCTAD, 2021.

2.2 Tariffs and non-tariff measures in ocean-based goods: a determining factor of market access

As for any sector or industry, trade in ocean-based products has become dependent on many new frontiers of trade policy that includes tariff and non-tariff measures. While most-favoured nation (MFN)[17] tariffs in ocean-based products have reduced over the years, particularly in developed countries, the incidence and prevalence of non-tariff measures (NTMs) and voluntary sustainability standards (VSS) has risen (see Box 2).

Box 2. Defining tariffs, non-tariff measures and voluntary sustainability standards

Tariffs are customs duties levied by governments on imported goods, which must be paid for before entry into market. For example, these could be in terms of a percentage (such as a 7 per cent tariff on tuna imports) or on a specific basis ($200 per ton), or both combined.

Non-tariff measures are policy measures – other than ordinary customs tariffs – that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices, or both (UNCTAD, 2010; UNCTAD, 2019d). These include:

- Technical measures, including SPS measures and TBT, which are product-specific requirements, mostly designed for public policy objectives to protect health, safety and the environment, such as packaging requirements, maximum residual limits of chemicals, and related inspections and certification; and
- Non-technical measures, a wide array of trade-related policies such as quotas, non-automatic import licensing, rules of origin and price control measures (UNCTAD, 2019d).

Voluntary sustainability standards are requirements that producers, traders, manufacturers, retailers, or service providers must follow relating to a wide range of sustainability metrics – social, environmental and economic. For example: worker health and safety, environmental impacts of production, human rights, etc. VSS aim to promote sustainability in global value chains through standard-setting and monitoring practices. VSS could be private i.e., those implemented by non-governmental organizations, industry groups or multi-stakeholder groups; or public i.e., those which are a result of government initiatives.[18]

The proliferation of both NTMs (regulations or private standards) in ocean-based sectors is the result of private sector responses to growing consumer concerns relating to health, safety and sustainability, as well as regulatory measures adopted by countries. Awareness-raising programmes, particularly in advanced economy markets, have motivated consumers to purchase healthy and safe products and support small-scale traders. The majority of NTMs applied to trade in ocean-based products tend to be SPS or TBT i.e., a response to health, safety and environmental concerns, respectively. A more detailed analysis of the reasons for the proliferation of NTMs can be found in Annex 2.

While NTMs aim primarily to protect public health or the environment, they also affect trade through information, compliance and procedural costs, and have been shown to be more restrictive than tariffs (UNCTAD, 2019b). This matters for exporters and importers because the ability to gain and to benefit from market access depends increasingly on compliance with trade regulatory measures. For example, certain NTMs may impose a need to conduct internationally certified and valid laboratory tests for contaminants of imported seafood. Owing to capacity constraints, such measures can inhibit exports from developing countries (UNCTAD, 2016b). Aside from NTMs, voluntary, third-party certification for fish and seafood products as a market-based incentive to

[17] The "most favoured nation" or "MFN" rates are the tariffs that countries promise to impose on imports from all other members of the WTO, unless the member is part of a preferential trade agreement. In practice therefore, MFN rates are the highest i.e., the most restrictive that WTO members can charge one another. There are two types of MFN rates: (i) "applied rates"– the rates each WTO member actually charges – this is the rate that exporters are advised to look at; and (ii) "bound rates", which are the ceiling or maximum rates that they are allowed to charge.

[18] See https://unfss.org/.

promote sustainable capture fisheries – ecolabelling – has also grown dramatically in terms of numbers and the range of criteria. Private standards can represent an additional hurdle that must be overcome if developing countries are to effectively access major markets and engage with high-value supply chains (IISD, 2016). If properly calibrated, however, they can promote growth while preserving natural biodiversity.

Striking a careful balance between environment, health and social objectives on one hand, and economic growth on the other, is of paramount importance to the overall policy framework needed to support sustainable ocean-based trade. Such trade measures, regulatory or non-regulatory, public or private, can influence sustainable outcomes as part of a coherent ocean-based trade policy framework.

Given the critical impact that such measures have on market access, the global and sectoral overview of sustainable ocean-based sectors delves into the tariff and non-tariff market access requirements that exporters of ocean-based goods must comply with to access international markets.

It is important to be aware of the existence and relevance of these requirements. While understanding tariff-related requirements is simple, NTMs can be more complex to navigate. Analysis of NTMs is often accomplished by statistical indicators that assess their incidence, i.e., the percentage of traded products to which at least one NTM applies; prevalence, i.e. the average number of NTMs applied to a product; and coverage, i.e., the percentage of trade in any given set of products covered by at least one NTM. This report analyses the NTM indicators affecting trade in ocean-based products. In doing so, it only considers NTMs that apply to all countries (these are referred to as "horizontal" NTMs) as preferential treatment is not covered.[19] The classifications used for the analysis are UNCTAD's SOEC and the NTM classification developed by the multi-agency support team (MAST) of which UNCTAD is a party. The UNCTAD–MAST classification of NTMs has 16 chapters which include import-related NTMs (i.e., NTMs countries impose on imported products), and measures that countries impose on their own exports (these are requirements to ensure that the product being exported conforms to reasonable standards of quality and safety). See Table 2.

In terms of data sources, the tariff data used for the report were accessed from World Integrated Trade Solution (WITS), while all NTMs data were extracted from UNCTAD's TRAINS database.[20] Within the framework of the international classification of NTMs, UNCTAD has collected comprehensive data on NTMs covering over 80 per cent of world trade.[21]

[19] A detailed description of the nuances in the treatment of the NTMs data in practical terms, and the procedures to synthesize the data into statistical indicators that provide information that is useful to build knowledge and derive conclusions, can be accessed here – https://unctad.org/webflyer/computing-non-tariff-measures-indicators-analysis-unctad-trains-data.

[20] Tariffs data used in the analysis can be accessed here – https://wits.worldbank.org/. NTMs data used in the analysis can be accessed here – https://trains.unctad.org/.

[21] All NTMs data collected by UNCTAD are published online and are accessible free of charge through the UNCTAD TRAINS portal – https://trains.unctad.org/. The database also allows quick access to full-text regulations of many countries.

Table 2. International classification for non-tariff measures

Imports	**Technical measures**	A	SPS measures
		B	TBT
		C	Pre-shipment inspection and other formalities
	Non-technical measures	D	Contingent trade-protective measures
		E	Non-automatic import licensing, quotas, prohibitions, quantity-control measures and other restrictions not including SPS measures or measures relating to TBT
		F	Price-control measures, including additional taxes and charges
		G	Finance measures
		H	Measures affecting competition
		I	Trade-related investment measures
		J	Distribution restrictions
		K	Restrictions on post-sales services
		L	Subsidies and other forms of support
		M	Government procurement restrictions
		N	Intellectual property
		O	Rules of origin
Exports		P	Export-related measures

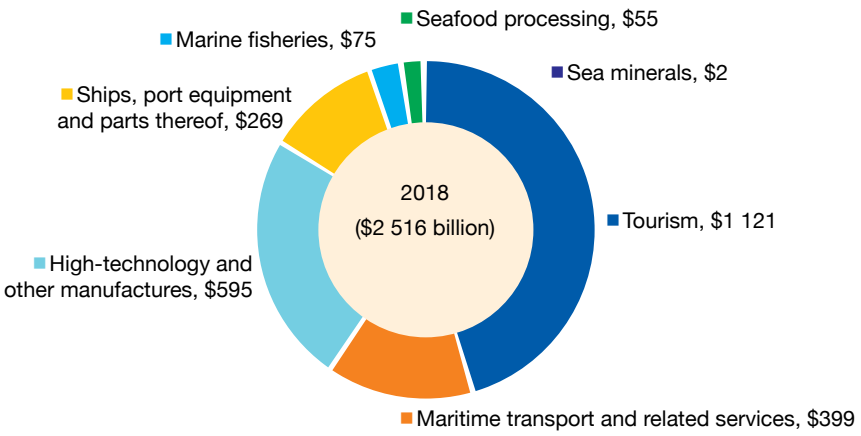
Source: UNCTAD, 2019d.

2.3 The trade dynamics of sustainable ocean-based sectors – global overview

A total of 100 clusters of industries are part of UNCTAD's SOEC – i.e., 100 subsectors at the most disaggregated level. Data on trade flows were available for 61 industry clusters, none of which is an ocean-based energy industry. Available data suggest that in 2018 the export value of the 61 industry clusters was $2 516 billion ($2.5 trillion). Ocean-based goods for 2018 are estimated at $997 billion (about $1 trillion), and ocean-based services at $1 520 billion (about $1.5 trillion). These values are conservative not only because of the absence of data for nearly 40 per cent of SOEC industry clusters, but also because the data available on the 61 industry clusters are sometimes incomplete: there are no data available for certain subcategories of goods (e.g., marine paint for the vessels cluster, nano-hose aeration for the fishing and aquaculture manufactures cluster, etc.), nor do the data include all trade in services modes (see "services" modes, below). As to exports from the ocean-based energy sector, only data on investment for a handful of countries are available (certain types of foreign investment are part of "Trade in Services" modes). According to estimates by the International Renewable Energy Agency (IRENA), public and private investment (national and foreign) in ocean-based energy subsectors is above $18.2 billion (IRENA, 2020a). Figure 1 and Figure 2 provide export values by ocean-based sector. It is important to keep in mind that industries considered unsustainable, such as oil and gas, are not included in the SOEC. The report also only considers trade flows (exports), thus failing to account for the value of oceans economy goods and services that are not exported. Most importantly, the report only considers tradable goods, but recognizes that the total value of ocean assets is much higher (WWF, 2015), while oceans by themselves are priceless.

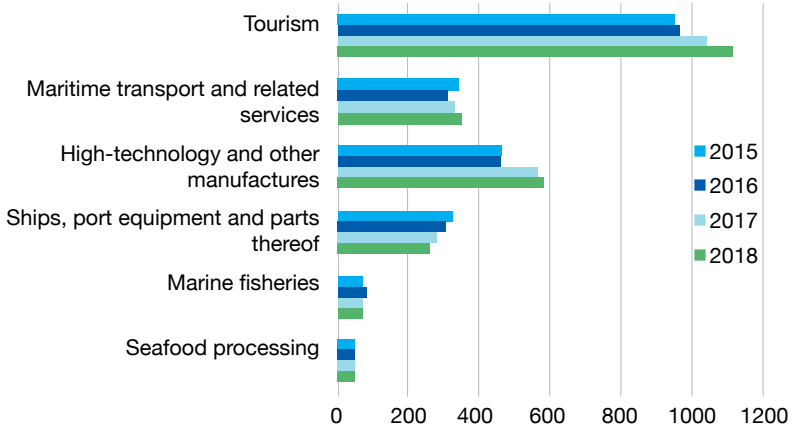
The subsections below provide a global overview of export trends of ocean-based categories: goods, services, and energy. Because of the critical role that market access measures play in the trade of goods, the subsection on ocean-based goods discusses tariff and non-tariff measures that apply to sustainable ocean-based sectors.

Figure 1. Ocean-based sector export value, 2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat and World Travel and Tourism Council (WTTC) data (2020).

Figure 2. Ocean-based sector export trends, 2015–2018 ($ billion)



Note: Data for Sea minerals are not presented in the figure because of their low value. Exports from this sector grew from $1 billion in 2015 to $2 billion in 2018.

Source: UNCTAD calculations based on UNCTADStat and WTTC data (2020).

2.3.1 Trade of sustainable ocean-based goods

Aggregate values mask important differences within sectors, regions and countries. That said, some trends are common across most sectors.

Among the ocean-based goods, the largest sectors in terms of export value were those with the highest value added: High-technology and other manufactures n.e.c., and Ships, port equipment and parts thereof (Figure 1). Within Marine fisheries, export trends suggest that demand for products with higher value-added is steady: exports of frozen finfish (parts and fillets) have witnessed stable growth over the period, while exports of fresh or chilled whole finfish have declined substantially. [22]

Other trends that stand out are those related to ocean-based resources used as inputs for manufacture or services. For example, sea sand (some of which contains granite or basalt and is utilized in jewellery, as pigments in paints, plastics, paper, foods and in electronics) witnessed high growth since 2015. Despite its low export value in comparison to other sectors, Sea minerals (including sea sand) exhibited double-digit growth in 2017 and 2018 (the compound annual growth rate [CAGR] for 2015 to 2018 was 21 per cent). High-technology and other manufactures

[22] Marine aquaculture exports (Sector B) are included in the calculation as part of Marine fisheries because HS codes do not differentiate among production methods.

n.e.c. saw double-digit growth in 2017 and positive growth since then, with a CAGR of 8 per cent. Similar trends were observed at the subsectoral level.

The leading exporters of ocean-based goods are developed countries from Europe, developing countries from Asia (even when China is excluded), followed by countries in the Americas (developed and developing). At the country level, trends and patterns are different across subsectors. In most subsectors, an increasing number of countries is trading sustainable ocean-based goods, particularly in less traditional industries such as processed seafood, sport boats and marine based cosmetics. The level of disaggregation, along with information on market drivers, also reveal that leading countries are venturing into new products and value chains. To provide a complete picture of the state of play of ocean-based goods across sectors, the following subsection examines the tariff and non-tariff barriers to trade that producers of ocean-based goods must comply with to access foreign markets.

Towards sustainable ocean-based trade: market access

A. Tariffs: mostly low

Across the five goods sectors, tariffs are highest in low-income countries, averaging 10.18 per cent, and lowest in high income countries, averaging 5.37 per cent. In middle-income countries, average tariffs are 7.9 per cent. The average of applied MFN rates is highest for low-income countries' imports of processed seafood (18 per cent). This is usually the result of countries' desire to protect domestic processing industries, or to pursue an import substitution policy. The tariffs in the other sectors are relatively low. In the case of fish and fish products, low tariffs are in large part explained by the United Nations Convention on the Law of the Sea, which grants coastal countries exclusive economic zones (Sumaila, 2016). In the case of non-agricultural products, low tariffs are the result of WTO obligations, as well as the growing participation of countries in preferential trade agreements, characterized by low tariff rates on non-agricultural products compared to WTO levels. Figure 3 provides an overview of the simple average of applied MFN tariffs across the five sectors, by country income levels.

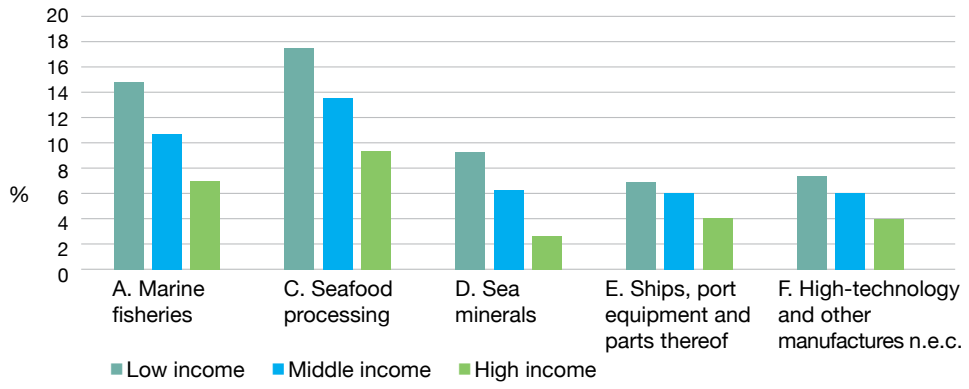


Figure 3. Average tariffs across oceans economy sectors, by sector and income level

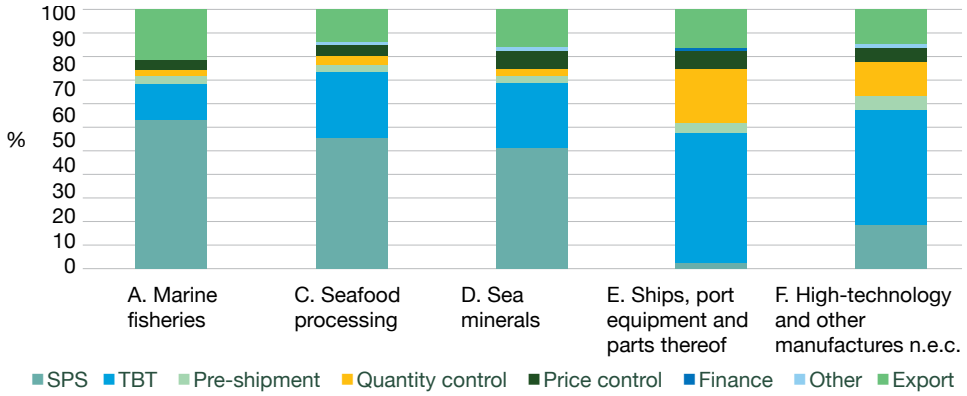
Source: UNCTAD calculations based on WITS, TRAINS data (2020).

B. Non-tariff measures: growing in number

For the 543 products identified as being a part of the ocean-based economy, an analysis of NTMs applied to all "traded" products across 88 countries for which NTMs data are available, reveals interesting facts. There is a high incidence of NTMs across the various sectors of the ocean-based economy. Nearly 97 per cent of the imported products face at least one import NTM and on average 6.7 different import measures apply to each product. For exports, NTMs apply to nearly 57 per cent of exported products and on average each exported product needs to comply with about two different requirements before leaving the home country for destination markets. As far as the sectoral distribution is concerned, the prevalence of NTMs is highest for Marine fisheries

(sector A), followed by Seafood processing (sector C), with 14.45 and 12.74 NTMs applied per traded product, respectively. The prevalence of NTMs is relatively lower in Sea minerals (sector D) and High technology and other manufactures n.e.c (sector F), with an average of 4.93 and 4.97 NTMs applied, respectively; and lowest for Ships, port equipment and parts thereof (sector E), for which an average of 3.04 NTMs are applied per product.

Figure 4. Types of NTMs in ocean-based economy

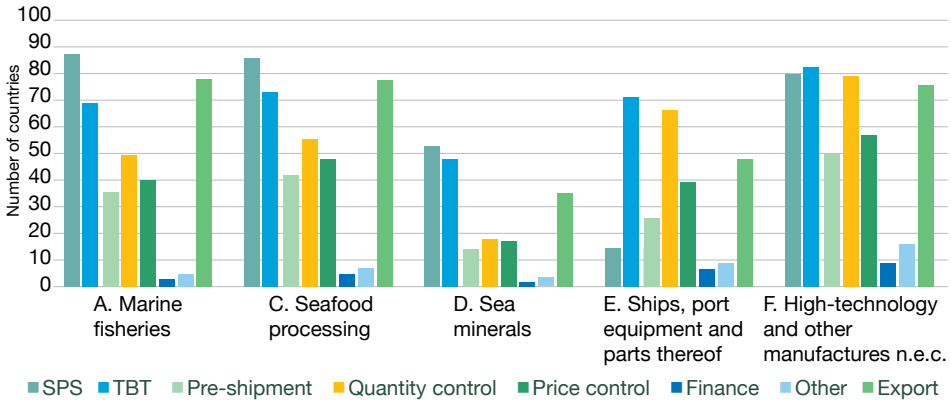


Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

Figure 4 shows the distribution of NTMs in each sector by type. SPS measures make for a little over 50 per cent of applied NTMs in sector A, C and D, while TBT measures are more commonly used in sector D and E, accounting for around 50 per cent of all applied NTMs. While TBT measures are also applied in sectors A, C and D, their share in overall NTMs is relatively smaller, at 14 per cent, 26 per cent and 26 per cent, respectively. Products within sectors A, C, and E, face pre-shipment inspections in many countries at the time of import. The prevalence of other NTMs, such as quality and price control or finance measures, is less than 10 per cent in most cases, apart from sectors E and F, where quantity control measures account for nearly 21 per cent and 13 per cent of total applied NTMs, respectively. Export NTMs account for 20 per cent of all NTMs in sector A, and nearly 15 per cent in the other sectors.

Figure 5 shows the number of countries applying different NTMs across sectors. SPS and TBT measures are the most commonly applied NTMs across the five sectors. These cover technical requirements pertaining to residue limits, hygiene requirements, product inspection and testing requirements which are considered necessary health and environmental safeguards. The use of quantity control is also high across all sectors, with over 50 countries applying these. These measures entail some form of prohibition or restriction on imports for non-technical reasons. The use of finance measures is least common across sectors. Finally, export measures are also commonly used in all sectors.

Figure 5. Number of countries applying NTMs by sector and type of measures



Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

2.3.2 Trade of sustainable ocean-based services

Compared to the trade in goods, trade in services is more difficult to track because these can be delivered through multiple channels which do not include shipping or passing through governments' customs administrations. Service transactions can be conducted through four modes (WTO, 2010):

- Mode 1. Cross-border supply – only the service crosses the border (e.g., e-commerce).
- Mode 2. Consumption abroad – occurs when people consume services while outside their country (e.g., coastal tourism).
- Mode 3. The service supplier establishes its commercial presence in another country (e.g., branches or subsidiaries – foreign direct investment).
- Mode 4. Presence of natural persons – when an individual moves temporarily into the territory of the consumer in the context of the service supply, whether self-employed or as an employee of a foreign supplier (e.g., consultants such as architects moving abroad to supervize construction work provide services under this mode of supply).

All six services subsectors listed in Table 1 can be provided through those four modes. At present, trade data are available for Tourism (mode 2 only) and for three subsectors that form part of Maritime transport and related services, aggregated as one. The data analysis suggests that Marine and coastal tourism is the largest oceans economy sector, with total exports worth $1,121 billion in 2018. This value was severely affected in 2020 and beyond due to the COVID-19 pandemic (UNCTAD, 2020b; UNWTO, 2020a). The COVID-19 pandemic and its long periods of confinement revealed the serious structural weakness of the sector, with severe economic and social consequences (see Section 3).

The Maritime transport and related services sector was estimated to be worth $399 billion in 2018. Data on trade flows by subsector are not available, but information on market drivers suggests that industries within the sector have followed different trends. The best-performing industries were cruise shipping (since then, the COVID-19 pandemic has undermined that industry's prospects) and liner shipping carriers, which closely monitor and adjust ship supply capacity to match demand and reduce costs while complying with stiffer environmental and sanitary regulations. Technology, cooperation and new business models have been key for resilience.

The main challenges of these two sectors are related to their environmental impact. Although sustainability regulations exist and are increasingly adopted or improved by countries, implementation and cooperation across countries are still lagging. Both sectors also face important data gaps. Close monitoring of these sectors is essential because they are an important source of job creation and foreign exchange, attract considerable foreign investment, and are determinant in efforts to ensure environmental sustainability. Each sector is characterized, however, by different types and levels of risk, growth potentials (in terms of jobs and economic benefits), and capital needs (investment).

Further information on market drivers and the challenges facing each subsector are discussed in Section 3. For the 12 other subsectors trade data do not exist and if they do, they are too aggregated, and/or country coverage is too limited, impeding a global assessment with any degree of confidence.[23]

[23] Some data exists for four subsectors, but they are aggregated with industries outside the ocean-based sectors, and the existing literature does not allow for the estimation of a coefficient to differentiate between land and ocean-based sectors. For example, it is not possible to estimate the share of "Fish and seafood processing and packaging" out of "Manufacturing services on physical inputs owned by others". There are also data that could be used as a proxy for three other ocean-services subsectors, yet these do not differentiate between exports, imports and national production, and the country coverage is too limited. For example, "Maritime port infrastructure maintenance" only covers 15 countries and does not consider major economies such as China, France, the Netherlands and the United States of America, among others.

2.3.3 Energy

Current high levels of greenhouse gases (GHG) in the atmosphere, ozone depletion and the negative impact they have on humans and nature, along with countries' search for reliable power supplies and fuel diversification (so to enhance energy security) and new technologies, have contributed to the development of numerous sources of renewable energy. UNCTAD's SOEC mapped a total of six sources (six subsectors) in addition to construction services of power plants, and excluding inputs (goods and services) required for the provision of energy and for power plants.[24] UNCTAD's SOEC classifies the energy sector as follows:

M1 Offshore wind energy
M2 Tidal power
M3 Wave power
M4 Submarine geothermal energy
M5 Chemical potential of seawater
M6 Marine biomass-based biofuels
M7 Power plants/projects.

Information about the value or volume of energy that is traded across the globe is not available. Further, most data do not stipulate whether the energy was produced on land or at sea. Reports and databases on the development of the sector suggest, however, that it is growing significantly, in terms of volume, investment and the number of countries that are implementing clean energy. This is the case, for example, of the Association of Issuing Bodies,[25] an integral part of the pan-European energy system: the volume of Guarantees of Origin issued between 2002 (the first year for which data are available) and 2018 increased from 15 TW to 596 TW (it was 343 TW in 2015). In Europe, businesses are the main driver of this development because they consider renewable energy an asset for future competitiveness due to its attractiveness in the eyes of customers, employees and investors (ECOHZ, 2019). Additionally, rapid technological improvements, supply chain efficiencies and logistical synergies have lowered costs, allowing renewable energies to compete on price with fossil fuels.

IRENA (2020b) identifies offshore wind energy among the renewable energies that can contribute the most to local value creation, job creation and environmental goals. New technologies are enabling the accelerated deployment of offshore wind. This source of energy has become one of the most competitive choices for new power generation in many countries, not least because worker expertise and technicians can be gathered from the offshore oil and gas industry. IRENA (2020b) also considers other marine energy sources to be the most innovative renewable technologies.

Another indicator of ocean-based energies is investment data. According to an IRENA (2020a) report, offshore wind energy is the world's fourth largest renewable source in terms of investment. The average value of investment in power generation capacity of Offshore wind energy, between

[24] Inputs (goods and services) are not part of UNCTAD's sustainable ocean-based energy sector because the existing international classifications do not allow for the separation of these from similar goods/services used in other sectors. Also, it is not known whether suppliers produce exclusively for the ocean-based energy subsectors, or what the share or value of inputs used by renewable energies is (only "anecdotal" information is available at this time). Inputs used by the energy sector are, however, included in the SOEC under larger categories; for instance, under high-technology, or R&D services, or even shipbuilding. For example, wind parks in marine waters are part of shipbuilding because offshore wind parks are produced by shipbuilders (OECD, 2016).

[25] The purpose of the Association of Issuing Bodies is to develop, use and promote a standardized system of energy certification for all energy carriers. That is the European Energy Certificate System which is based on structures and procedures that ensure the reliable operation of energy certificate schemes in Europe. These schemes satisfy the criteria of objectivity, non-discrimination, transparency and cost effectiveness, in order to facilitate the international exchange of guarantees of origin. As for guarantees of origin, these are the only precisely defined instruments evidencing the origin of electricity generated from renewable energy sources (ECOHZ, 2019). A guarantee of origin is a tracking instrument defined in article 15 of the European Directive 2009/28/EC.

2017 and 2019, was $18 billion; Marine and other, $0.02 billion; Geothermal $3 billion; Bioenergy $13 billion; and Hydropower $22 billion. Among these categories of power generation, only the first two can confidently be attributed to ocean-based energy.

The level of investment in the sector is expected to keep rising. Foreign direct investment in renewable energy not only reached an all-time high in the first quarter of 2020, but investors announced over $23 billion of cross-border renewable energy investment for 2020 (fDi Markets, 2020). That is in spite of the uncertainty caused by the COVID-19 pandemic and in contrast with investments in fossil fuels which have plummeted (fDi Markets, 2020). The short-term impact of COVID-19 on offshore wind is not expected to be significant, as most projects for 2020 and 2021 are already either partially commissioned or at an advanced stage of development, particularly in Europe, the largest offshore wind market (IRENA, 2020b). As for the development of the sector after 2021, IRENA suggests that it will depend on the state of advancement of pre-development work, such as obtaining necessary permits, including environmental approval.

While Europe continues to dominate the market for offshore wind, countries such as China, Japan and the Republic of Korea have set ambitious targets for developing additional capacity. The transition to green energy is also observed in Asia with the rising use of biofuels. Even the aviation industry is beginning to invest in biofuels, with companies such as Cathay Pacific, Japan Airlines and Garuda Indonesia retrofitting some aircraft for biofuel use. Traditional sources, such as coconut and palm oils have been unable to keep pace with demand, and companies are turning to algae as a feedstock. Algae can produce 20,000 to 80,000 litres of biofuel per ha annually, making algae a much more productive option than terrestrial biofuel crops (PEMSEA, 2015).

3. SECTOR PROFILES: A GLANCE AT TRADE TRENDS AND DRIVERS OF OCEAN-BASED ECONOMIES

The sector profiles in this section aim to enhance clarity about the industries that form part of the sustainable ocean-based economy: their trade, export dynamics, market drivers, and the opportunities and challenges for the development of these sectors. In the case of goods, this section examines market access based on an analysis of tariff and non-tariff barriers to trade.

Sector profiles aim to provide policymakers with concrete information about industries that can contribute to the development of coastal economies. A better understanding of sustainable ocean-based subsectors will inform decision making and improve the management of risks and opportunities. It will also facilitate coordinated actions between industry and government to address risks that cannot be resolved by each industry alone.

3.1 Marine fisheries

The sector includes marine species catches and aquaculture used for commercial and industrial purposes. Catches, or marine fisheries harvesting, takes place offshore with all types of fishing equipment (including fishers, vessels, gear, etc.). Aquaculture covers products that are a result of aquafarming or fish farming of seawater organisms for human use or consumption, under controlled conditions (Soprana, 2019). At present, HS codes for Marine fisheries do not distinguish between catches and aquaculture. Therefore, the sustainable ocean-based classification and the trade trends discussed herewith refer to the trade of both catches and aquaculture. The sector does differentiate, however, between five groups of marine organisms: Finfish; Crustaceans; Molluscs; Aquatic invertebrates other than crustaceans; and Other living marine products including aquatic plants, seaweeds and other algae and cultured pearls. The subsector further disaggregates subsectors according to value-added, namely: 1) Whole, 2) Parts, gilled, gutted, etc., and 3) Fillet, meat, portions and sticks.

Trade trends

Exports of Marine fisheries in 2018 were estimated to be $75 billion. The largest subsector was Finfish (70 per cent of total exports). Figure 6 and Figure 7 depict the sector structure and trends. In terms of growth, all sectors except Other living marine products witnessed an oscillating or declining path between 2015 and 2018. The CAGR for the period 2015 to 2018, all subsectors included, was just below –2 per cent.

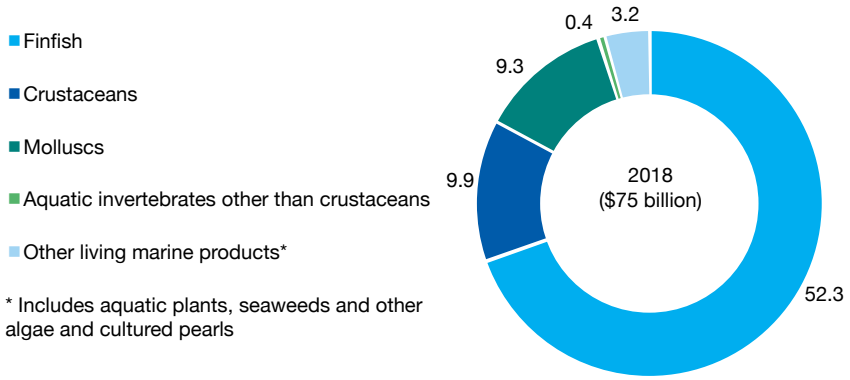


Figure 6. Marine fisheries export composition by subsector, 2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data.

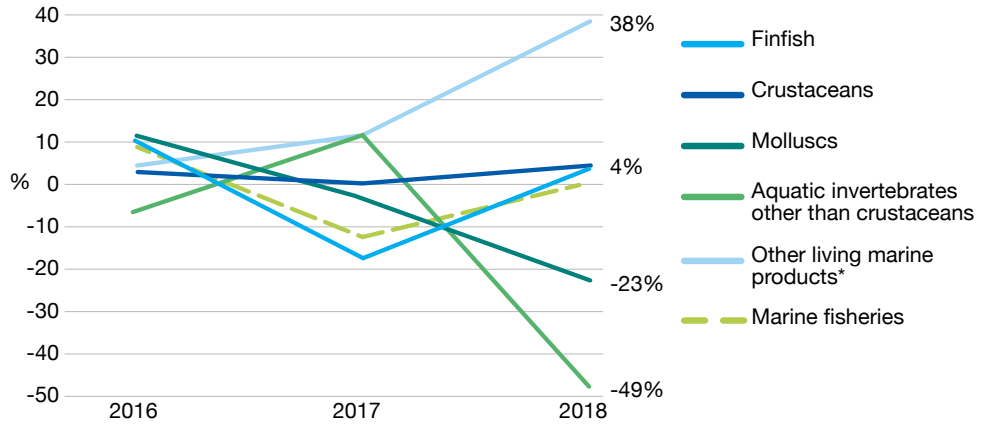


Figure 7. Marine fisheries export annual percentage change by subsector, 2015–2018

*Other living marine products includes aquatic plants, seaweeds and other algae, and cultured pearls.

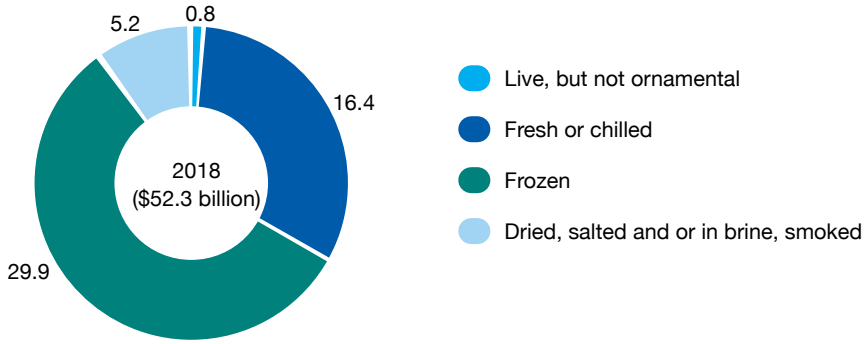
Source: UNCTAD calculations based on UNCTADStat data.

Although the market share in Marine fisheries of Other living marine products is 3 per cent on average for the period (4 per cent in 2018), this is the fastest growing subsector, exhibiting positive and stable export growth over the period: the CAGR for 2015 to 2018 was 17 per cent. The different trends and characteristics of each subsector are discussed below.

Finfish

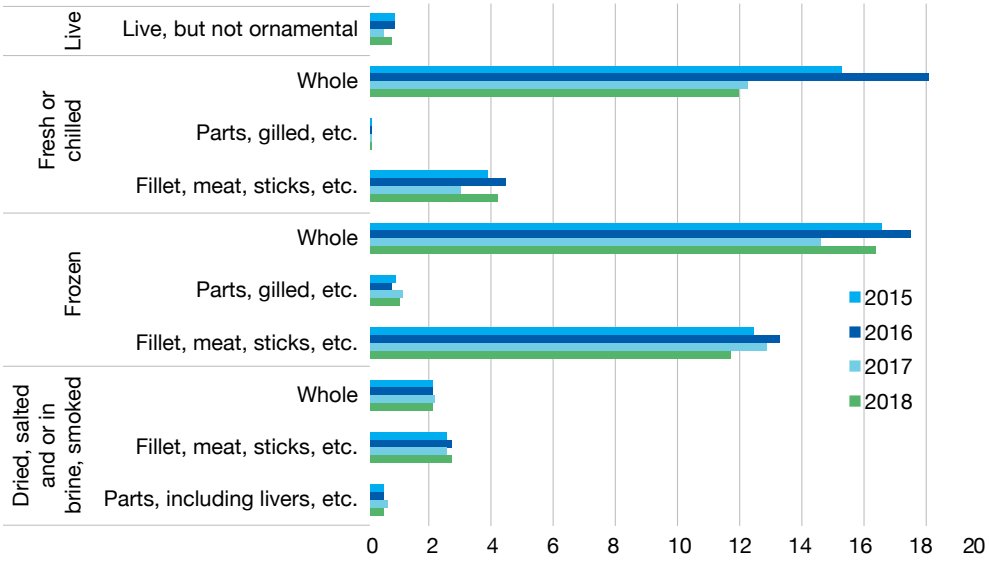
The average annual value of Finfish exports between 2015 and 2018 was estimated at $54 billion; it reached $52 billion in 2018. The subsector's exports declined by 17 per cent between 2016 and 2017 and barely recovered in 2018 (exports grew by 4 per cent compared to 2017). The CAGR for 2015 to 2018 was just above 2 per cent. The trend is primarily explained by the decline in exports of Fresh or chilled finfish and Frozen finfish in 2017 (–32 per cent and –9 per cent, respectively). The two subsectors account for 88 per cent of Finfish exports (average 2015–2018). Figure 8 and Figure 9 provide further details. It should be noted, however, that exports of Parts, gilled, etc. (within the subsectors Fresh or chilled finfish and Frozen finfish), and Fillet, meat, and other (within the Dried, salted, etc. subsector) follow the opposite trajectory: Parts, gilled, etc. of Fresh or chilled finfish saw positive growth over the entire period; Parts, gilled, etc. of Frozen finfish witnessed double-digit growth in 2017. This surge in demand may be due to the growth of the fish processing sector (more on this in Section 3.2). Furthermore, export trends suggest that demand for products with higher value-added is more stable: exports of Dried, salted, etc. subsectors have only witnessed slight changes, while Whole finfish has declined substantially.

Figure 8. Finfish export composition by subsector, 2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data.

Figure 9. Finfish export trends by subsector, 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data.

Table 3. Finfish export growth by subsector, 2015–2018 ($ billion)

SOEC's classification		Subsector annual percentage change			
		CAGR	2016	2017	2018
Live, but not ornamental		−2.7%	−0.7%	−41.8%	59.5%
Fresh or chilled	Whole	−7.7%	18.6%	−32.3%	−2.1%
	Parts, gilled, etc.	23.0%	52.0%	13.3%	8.1%
	Fillet, meat, sticks, etc.	2.7%	14.9%	−33.3%	41.4%
Frozen	Whole	−0.4%	5.5%	−16.7%	12.5%
	Parts, gilled, etc.	6.5%	−11.8%	44.5%	−5.1%
	Fillet, meat, sticks, etc.	−1.9%	6.7%	−3.1%	−8.7%
Dried, salted and/or in brine, smoked	Whole	0.3%	1.0%	1.7%	−1.9%
	Fillet, meat, sticks, etc.	1.9%	7.7%	−6.5%	5.2%
	Parts, including livers, etc.	−3.2%	−3.4%	13.7%	−17.3%

Source: UNCTAD calculations based on UNCTADStat data (2020).

At the country level, China and the United States of America are leading exporters of finfish, yet they followed different paths over the period (Figure 10 and Figure 11). Exports from China declined while those of the United States of America not only increased, but the country almost doubled its global market share (from 5.3 per cent in 2016 to 9.5 per cent in 2018). Other leading markets that stand out over the period are Japan, Spain, the United Kingdom and France which exhibited double-digit growth and increased market share. On the other hand, countries that lost market share and saw a significant decline in exports are Norway and Chile.

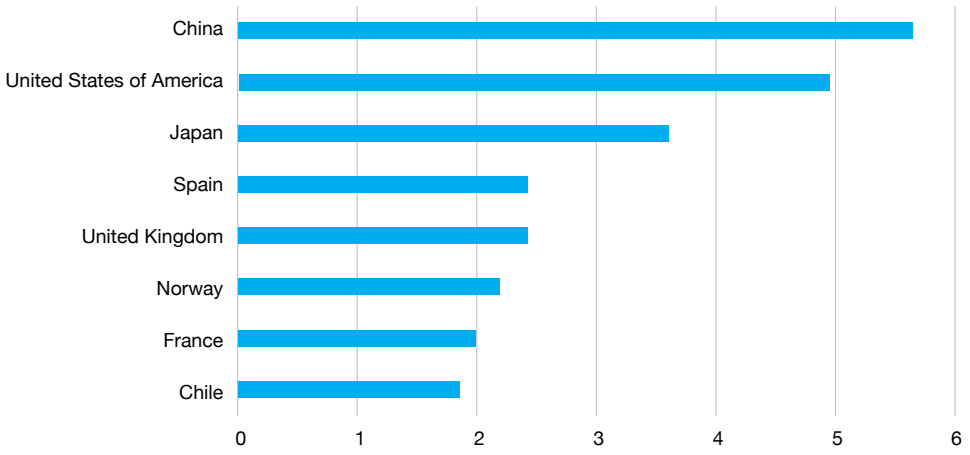


Figure 10. Leading exporters of finfish, 2018 ($ billion)

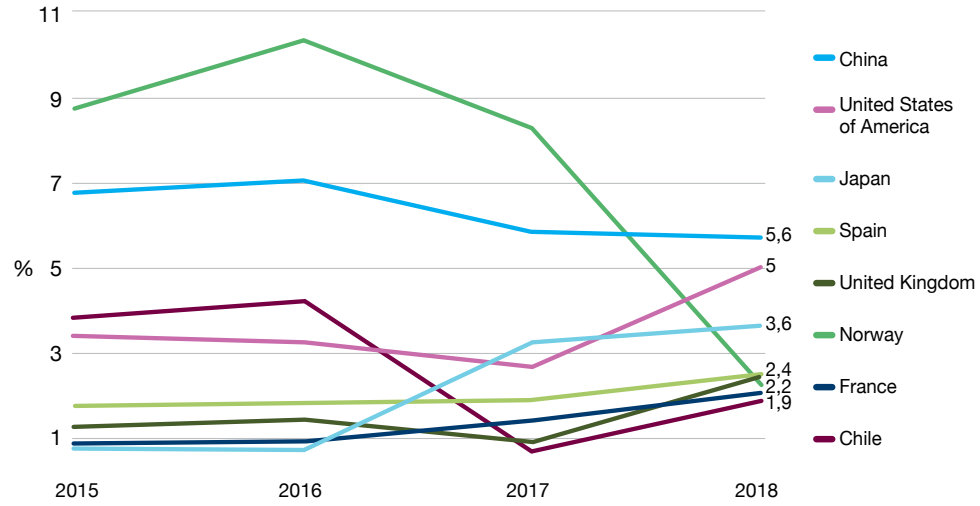


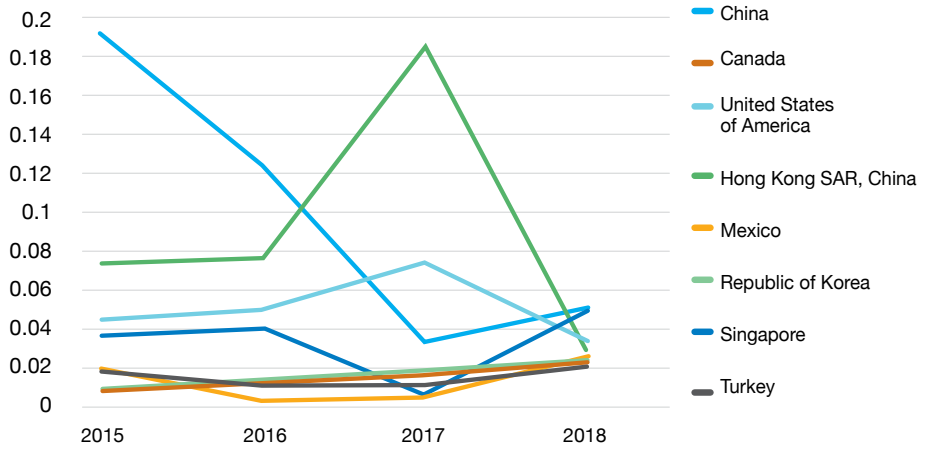
Figure 11. Export trends of leading finfish exporters, 2015–2018

Source: UNCTAD calculations based on UNCTADStat data (2020).

Aquatic invertebrates other than crustaceans

In the case of Aquatic invertebrates other than crustaceans, the leading exporting economies are China, Canada, the United States of America, and Hong Kong SAR, China. All those economies, except Canada, witnessed a double-digit decline between 2015 and 2018.

Figure 12. Leading exporters of aquatic invertebrates other than crustaceans, 2015–2018 ($ billion)

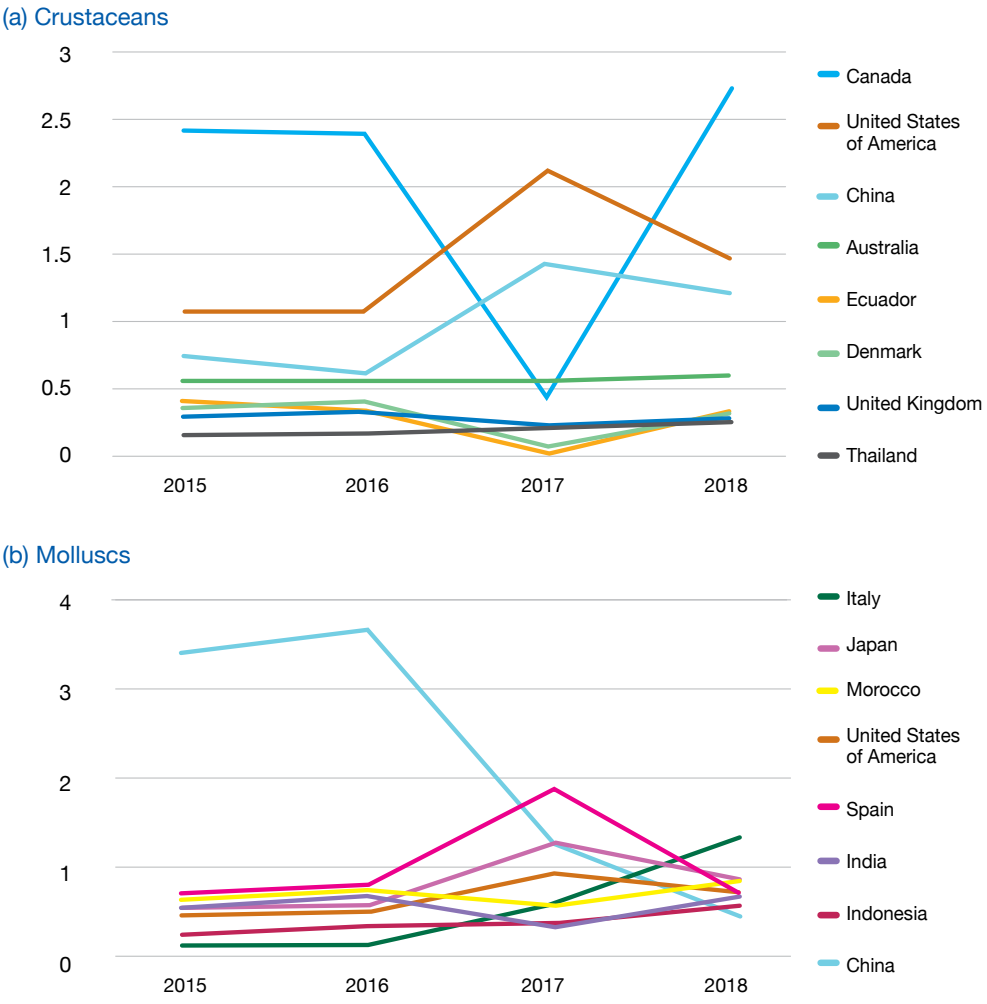


Source: UNCTAD calculations based on UNCTADStat data (2020).

Crustaceans and molluscs

Developed countries dominate exports of crustaceans. CAGR growth has been mixed (Figure 13). In the case of molluscs, five of the top 10 exporters are from developing countries. CAGR is positive in all countries but China (CAGR –49 per cent).

Figure 13. Leading exporters of crustaceans and molluscs by country, 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Other living marine products

Exports of Other living marine products in 2018 were close to $3.2 billion ($3 178 million). Within the subsector, natural pearls and sponges saw a significant increase of exports between 2015 and 2018 (CAGR 29.7 per cent). Eight of the 10 leading exporters of Other living marine products are developed countries. All 10 countries saw positive CAGR, and, with the exception of Germany, the annual percentage change of the top 10 countries was positive. Among the top 10 developing countries, Indonesia, China and Republic of Korea are the largest exporters, although Chile exhibited negative CAGR (–29 per cent and –27 per cent, respectively). Figure 14, 15 and 16 provide further details about the trends.

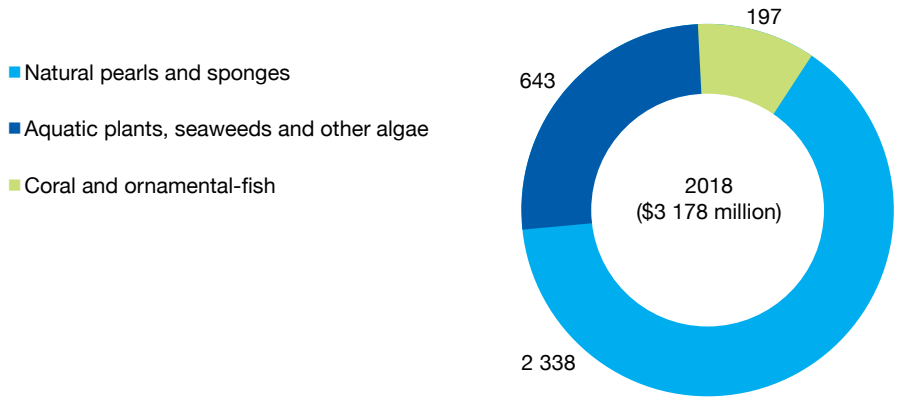


Figure 14. Other living marine products export composition by subsector, 2018 ($ million)

Source: UNCTAD calculations based on UNCTADStat data (2020).

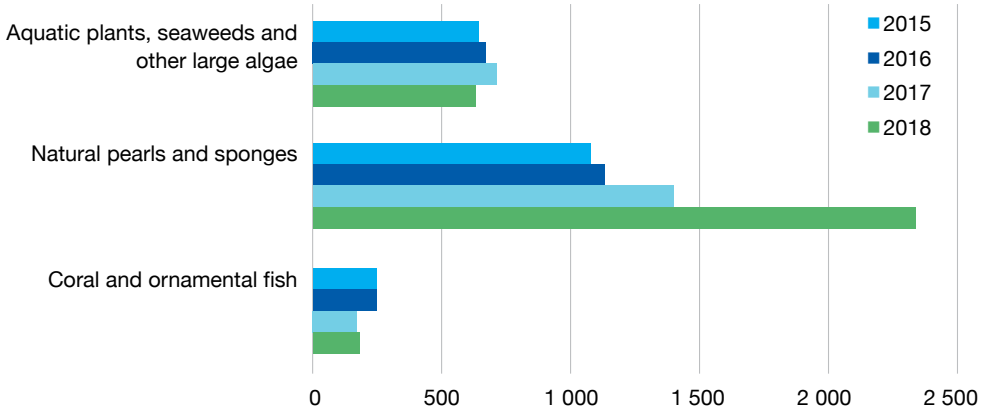
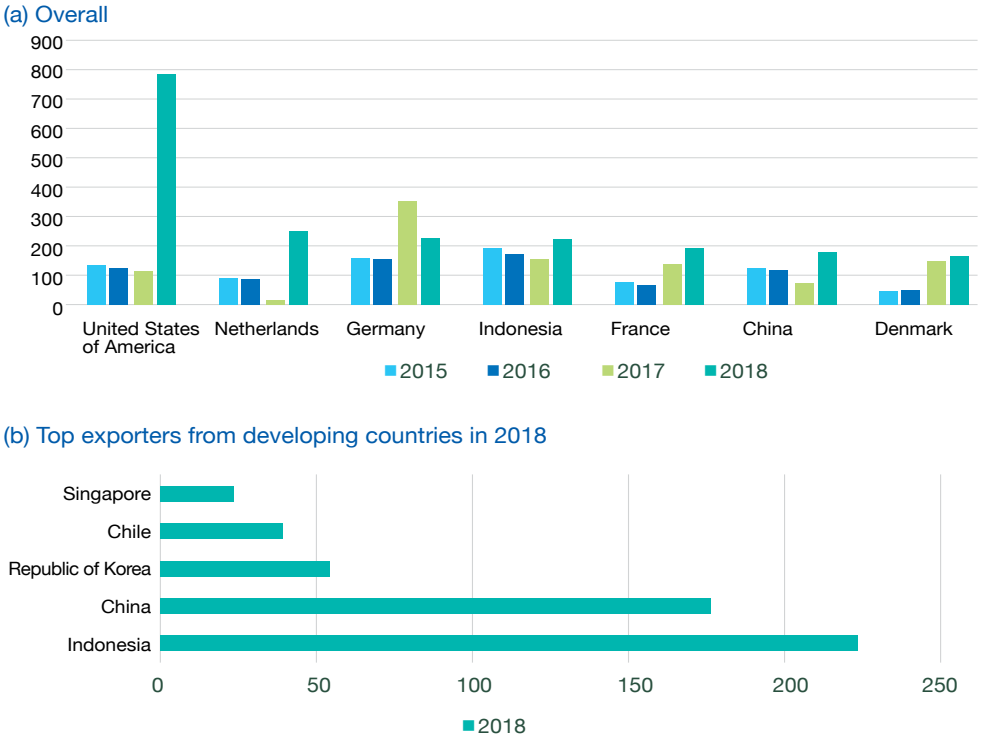


Figure 15. Other living marine products export trends by subsector, 2015–2018 ($ million)

Source: UNCTAD calculations based on UNCTADStat data (2020).

Figure 16. Leading exporters of other living marine products by country, 2015–2018 ($ million)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Market drivers and market access

Market drivers

Marine fisheries account for 88 per cent of global fish catches and for about 50 per cent of world aquaculture. They provide, on average, 17 per cent of the global population's intake of animal proteins (FAO, 2020). Demand has been on an upward trend since the 1960s and is expected to continue growing. Global demand for food fish grew at an average annual rate of 2.4 per cent between 1961 and 2017 (FAO, 2020), a higher rate than that of all other animal protein foods, such as meat, dairy, milk, etc. (their growth rate was 2.1 per cent), and greater than the annual world population growth rate (1.6 per cent). Across country groups, the LDCs stand out as their consumption of food fish over the past 20 years grew at 2.9 per cent per year (FAO, 2020). The market is predicted to increase by 20 per cent from 2016 to 2030 (McKinsey & Company, 2020a).

The main drivers of the sector have been population growth, the expansion of the middle class, greater urbanization (which means that more people have access to seafood and electricity for refrigeration) and changing and diversifying dietary patterns (mirroring rising income levels and increased demand for healthy products) (FAO 2020; UNCTAD 2018). An increased number of fish processing manufacturers (Section 3.2.) has enabled producers to meet the higher demand for marine fisheries.

Sustainable management, technology and policies are the leading forces shaping the supply side. New technologies have given way to numerous solutions for aquaculture, transportation and processing that allow compliance with sanitary standards, lower costs (due to improved management) and increased production (most notably for aquaculture in Asia). One of the most important technological innovations is advanced analytics[26] which contributes to sustainable fisheries supply. Advanced analytics facilitate increased transparency with respect to seafood

[26] See Christiani et al. (2019) for more information on how advanced analytics are helping fisheries thrive while simultaneously protecting endangered ocean resources.

capture and management of aquaculture production, and enhance production (e.g., achieving desired fish weight using less feed, less waste, and at lower costs) (McKinsey & Company, 2020a). These not only have a positive economic impact, but also minimize the negative environmental impact of fisheries caused by overfishing and illegal, unreported and unregulated fishing (IUU),[27] which contribute to the depletion of fish stocks.

Challenges

Many coastal communities rely on small-scale fisheries, but the local production and consumption of seafood face stiff competition. They must cope with ever-expanding industrial fisheries which export low-cost seafood around the world and supply fishmeal to support aquaculture. In many parts of the world, small-scale fisheries (artisanal or subsistence) and large-scale commercial fisheries compete for access to resources, with the result that stocks may become overexploited (UNCTAD, 2018). Small-scale fisheries must also cope with subsidies and IUU fishing, which not only impose unfair competition but also impact the sustainability of resources. They are also affected by the overcapitalization of industrial fisheries resulting from perverse incentives created by subsidies (see next subsection, Market access). Fisheries and governments must also deal with overexploitation resulting from IUU fishing. The international community has taken a stand on IUU fishing: in 2015 the elimination of IUU fishing was inscribed in the Sustainable Development Goals; in 2016 the Food and Agriculture Organization of the United Nation's (FAO's) Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing entered into force.[28] Nowadays, IUU fishing is condemned in virtually all national legislations and funds for its enforcement are in place. Most countries, however, are falling short on IUU fishing sanctioning, monitoring and transparency, and related subsidies allocation. Most countries do not compile records for IUU fishing determinations at the national level and are missing national *ex ante* and *ex post* procedures for withdrawing subsidies in proportion to the type of violation (Vivas Eugui, 2020).

Different rates of technological adoption are also affecting progress towards sustainable management of fisheries. Although large industrial fisheries are successfully utilizing technology for the management of fisheries resources, small-scale coastal fisheries are lagging behind, either because they are unregulated or loosely regulated, or because of a lack of institutional and/or technical capacity (Costello et al., 2019).

Other challenges have to do with market access measures, tariffs and NTMs. These are discussed in the next subsection.

Market access

Subsidies

Fisheries subsidies have been under negotiation at the WTO for over two decades. Despite arduous negotiations and the impetus provided by SDG target 14.6, subsidies are still present in many countries' policies. The most harmful type of subsidies are capacity-enhancing subsidies which constitute direct and indirect financial transfers, usually from the government to private companies. These subsidies reduce fishing costs, increase catch and raise fishing revenues for the beneficiary (Costello et al., 2019). For example, fuel subsidies give unfair advantage because fuel can account for 50 to 80 per cent of fishing voyage costs (Vivas Eugui, 2020). Furthermore, when the application of subsidies is according to volume harvested, subsidies can contribute to overfishing, compromise fish stock productivity and may apply more stress to stocks of endangered species. Estimates of total annual global fisheries subsidies amount to approximately $35.2 billion, of which around $22.2 billion were given to activities that enhance capacity (Sumaila et al., 2019).

[27] Hosch and Blaha (2017) note that weak oversight and enforcement by flag states with regard to fishing vessels flying their flags, and because some port states allow or ignore the landing of illegal catches, products derived from IUU fishing continue to reach lucrative seafood markets and hence generate the financial returns that encourage the practice.

[28] FAO Agreement on Port State Measures (PSMA) – http://www.fao.org/port-state-measures/en/.

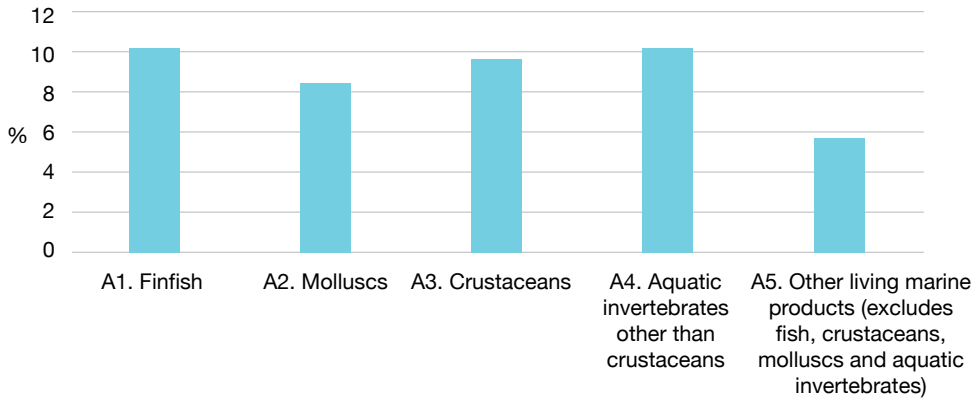
At present, negotiations focus on how to move away from harmful subsidies, and determining what disciplines are necessary to ensure good management and avoid loopholes that can allow subsidies to be used for objectives other than the one agreed upon.[29] Negotiations also centre on the regulation of special and differential treatment status, as small-scale fisheries need to be treated more favourably than industrial fisheries. Achieving an agreement will require technical solutions as well as serious political leadership (IISD, 2020). It will also demand support for data gathering and notification in accordance with Article 25 of the WTO Subsidies and Countervailing Measures Agreement, as well as national and regional policy and legal reforms to implement new disciplines (Vivas Eugui, 2020).[30]

Tariffs and non-tariff measures

Just as negotiations on the issue of fisheries subsidies have been garnering much attention and prominence at the WTO, a high level of commitment by WTO member states in the past few decades has resulted in a significant lowering of tariffs in the sector. Major fish importers have cut tariffs and reduced duties significantly. Even beyond the general tariff cuts, developed countries have granted certain developing countries preferential market access under schemes such as the Generalized System of Preferences (GSP). For instance, tariff reductions in Thailand have stimulated fisheries imports from Myanmar, Viet Nam, and Cambodia for processing and subsequent export (World Fish Center, 2008). Tariff barriers in developing countries tend to be slightly higher than in developed countries, owing to the desire to protect local fisheries sectors. This in turn has weakened intra-regional trade significantly (Sumaila, 2016).

Within the sector, the average applied MFN tariffs range from 6 to 10 per cent. Tariffs for subsector A1 Finfish, A3 Crustaceans and A4 Aquatic invertebrates other than crustaceans are the highest (Figure 17). Besides this, a handful of countries still have high tariffs on marine fisheries products (Figure 18). There are some marine products that also face high average tariffs in a significant number of countries (see Table 4).

Figure 17. Average tariffs by subsector, 2018



Source: UNCTAD calculations based on WITS, TRAINS data.

[29] Pascal Lamy at IISD Webinar: Fisheries Subsidies: How Can Leaders Use the Trade System to Deliver for People and Planet? 8 July 2020.

[30] For a discussion on the latest consolidated text for a potential agreement on tackling harmful fishing subsidies and how agreement can be achieved, see Vivas Eugui (2020).

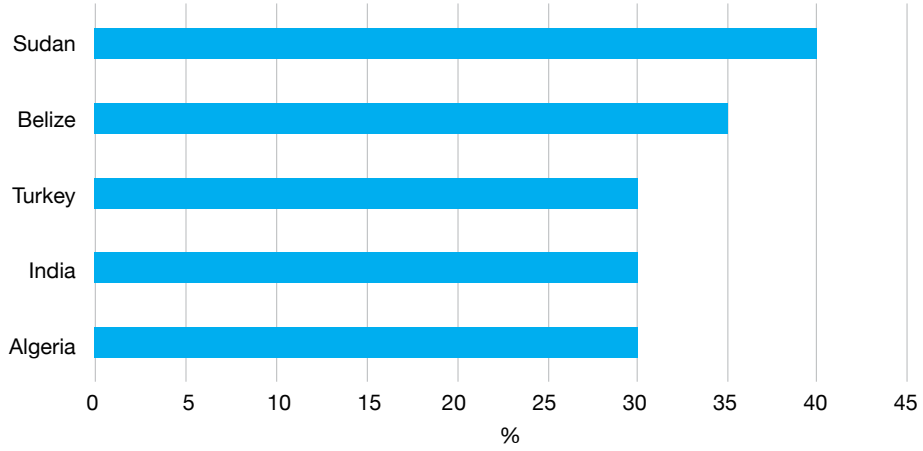


Figure 18. Highest tariffs for marine fisheries products by country, 2018

Source: UNCTAD calculations based on WITS, TRAINS data.

Table 4. Marine fisheries products at an HS six-digit level with tariffs above 20 per cent, 2018

HS6	Product	OE subsector	Number of countries
30457	Rays and skates (Rajidae) meat, minced or not, fresh or chilled	A1 Finfish	90
30448	Rays and skates (Rajidae) fillets, fresh or chilled	A1 Finfish	90
30447	Dogfish (Squalidae) and other sharks, fillets, fresh or chilled	A1 Finfish	90
30553	Dried gadiformes, whether or not salted, but not smoked	A1 Finfish	90
30456	Dogfish (Squalidae) and other sharks, meat, minced or not, fresh or chilled	A1 Finfish	90
30732	Mussels "*Mytilus spp., Perna spp.*", frozen, even in shell	A3 Crustacean	89

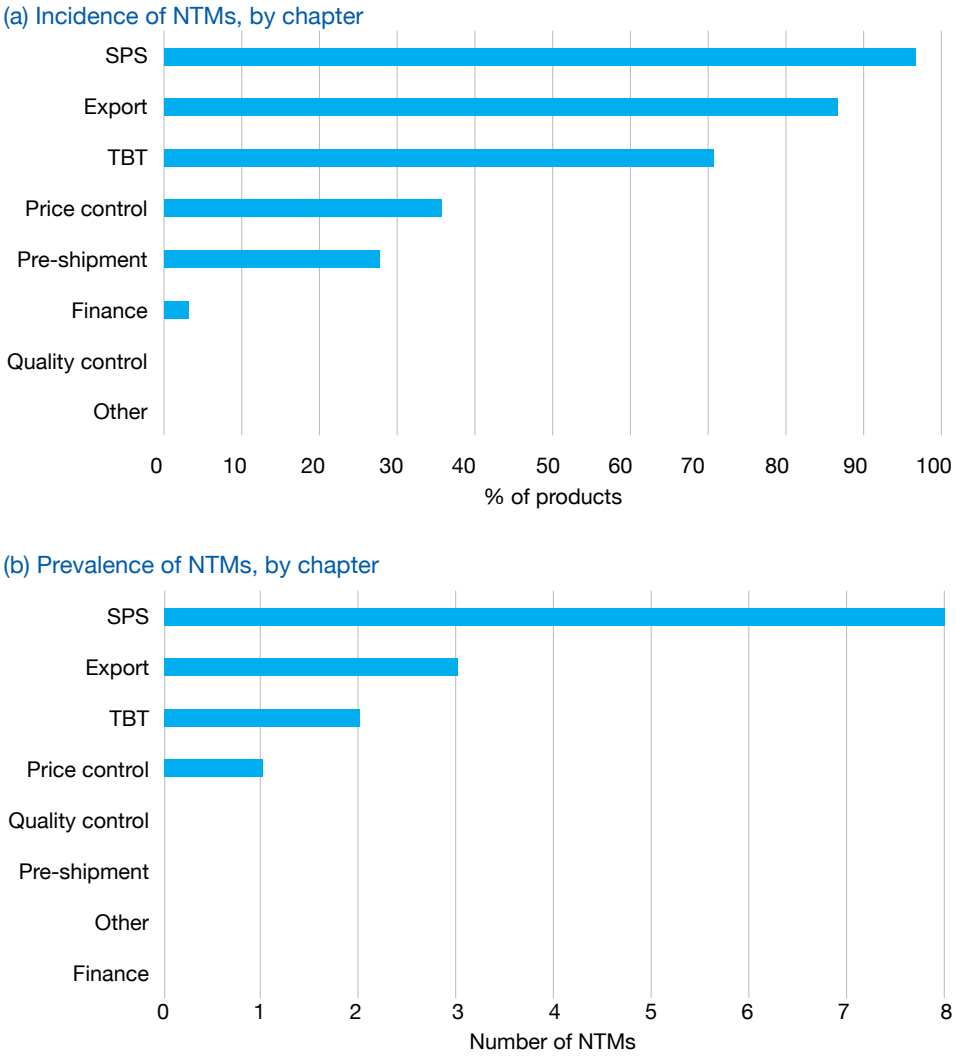
Source: UNCTAD calculations based on WITS, TRAINS data.

Non-tariff measures

In all countries, nearly 100 per cent of imported marine fisheries products face SPS measures. The corresponding percentage for TBT and export measures is nearly 70 per cent and 80 per cent, respectively. This corresponds to safety concerns associated with food products and also points to the relative complexity and different approaches underpinning regulations and requirements which vary across countries. For other types of NTMs, the incidence is significantly lower, and even negligible in some cases.

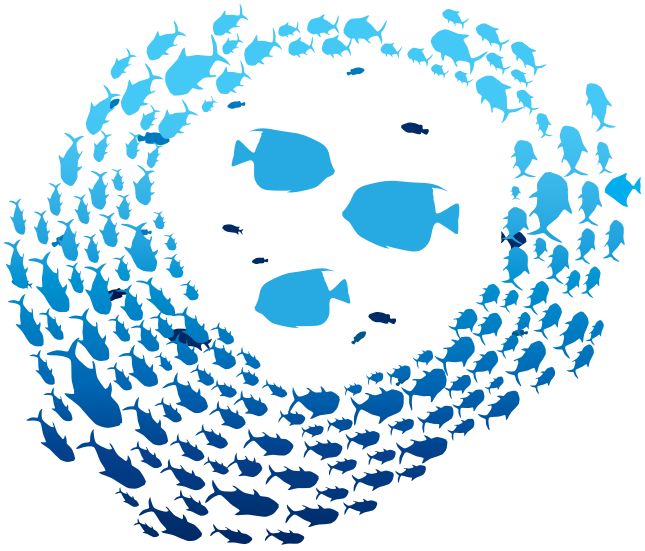
Marine fisheries face nearly eight SPS measures and two TBT measures per product. The prevalence of other import measures is less than one measure per imported product. Export measures, i.e., requirements that countries impose on their own exports, are relatively less prevalent with an average of three measures applied per product (Figure 19). Export restrictions are also becoming common in terms of incidence and prevalence. Food security concerns and more recently, COVID-19 measures, may be behind this tendency.

Figure 19. Incidence and prevalence of NTMs in marine fisheries by chapter



Source: UNCTAD calculations based on UNCTAD TRAINS data.

The average number of NTMs applied per product is highest in Gambia, Switzerland, India, China, Bangladesh and Viet Nam. These countries apply as many as 25 or more NTMs per imported marine fisheries product (see Figure 20). Exporting to these countries can thus be relatively difficult.



[31] For a better understanding of the concepts on incidence and prevalence see Section 2.2 above.

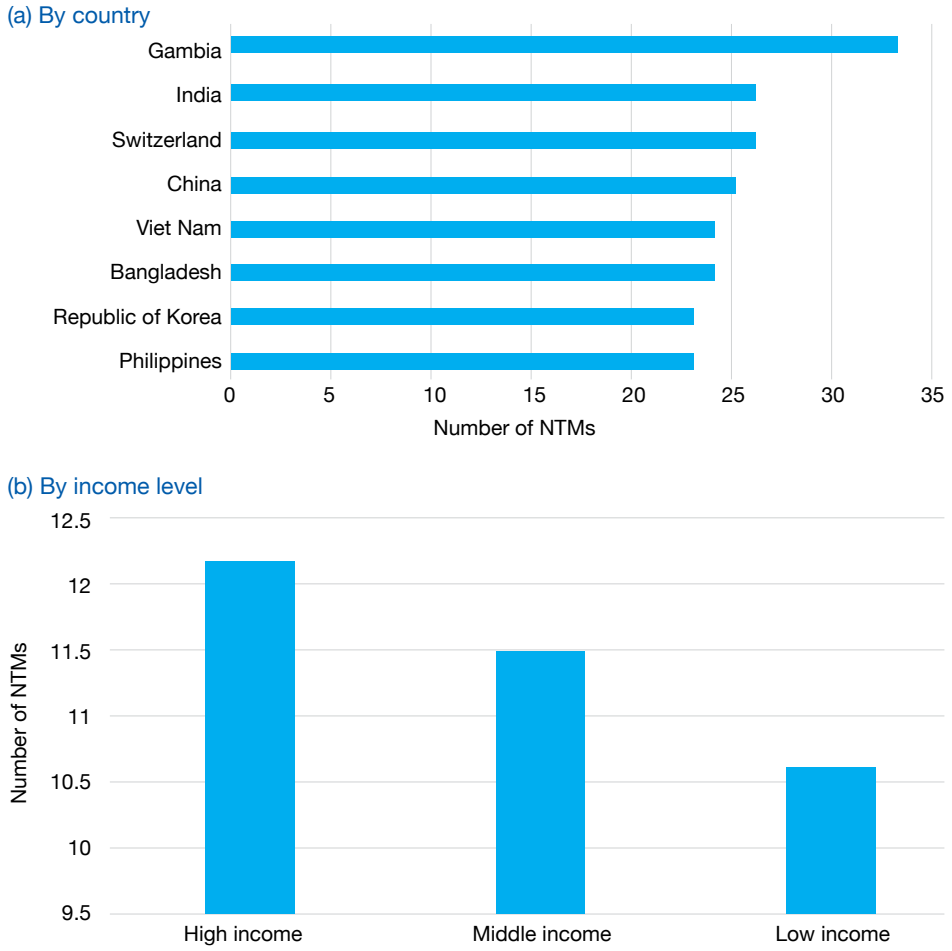


Figure 20. Prevalence of NTMs by country and income level: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS data.

By income level, the use of import measures on marine fisheries products is almost equally prevalent in countries of all income levels (Figure 20). High income countries, on average, apply a marginally higher number of NTMs per imported product, with an average of 12 import measures per imported product. Low-income countries apply the least number of NTMs per imported product, although the average number of applied measures is still high (10.6 import measures per product). Amongst the various subsectors within marine fisheries, the average number of import measures used is over 10 NTMs for most subsectors. The prevalence of NTMs is highest in sector A1 Finfish, with nearly 12 import NTMs per product (Figure 21).

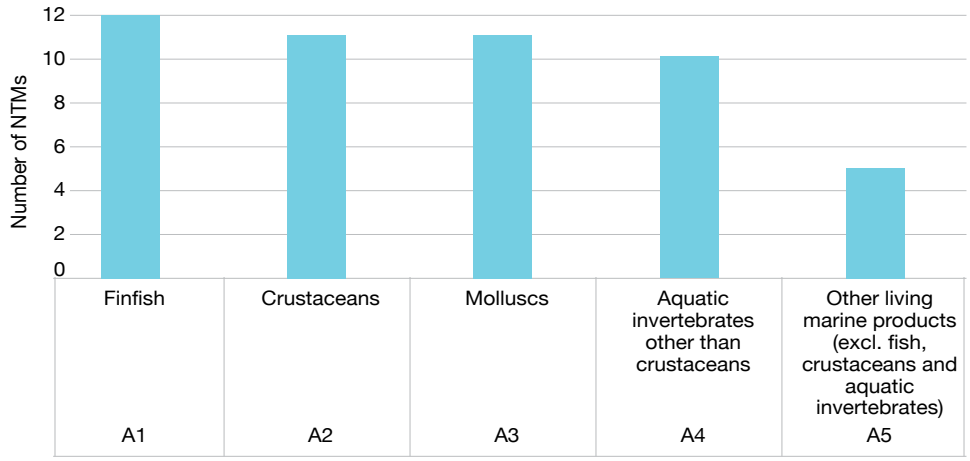


Figure 21. Prevalence of NTMs by subsector: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS database.

Table 5 shows the most common type of NTMs applied to subsectors A1 to A5 under UNCTAD's SOEC.

Table 5. Most commonly used NTMs by subsector

A1 Finfish	A2 Molluscs	A3 Crustaceans	A4 Aquatic invertebrates other than crustaceans	A5 Other living marine products (excludes fish, crustaceans, and aquatic invertebrates)
A83 Certification requirements for SPS reasons	A83 Certification requirements for SPS reasons	A83 Certification requirements for SPS reasons	A83 Certification requirements for SPS reasons	A82 Testing requirements for SPS reasons
A14 Authorization requirement for SPS reasons for importing certain products	A31 Labelling requirements for SPS reasons	A14 Authorization requirement for SPS reasons for importing certain products	A14 Authorization requirement for SPS reasons for importing certain products	A14 Authorization requirement for SPS reasons for importing certain products
A84 Inspection requirements for SPS reasons	A84 Inspection requirements for SPS reasons	A84 Inspection requirements for SPS reasons	A84 Inspection requirements for SPS reasons	A84 Inspection requirements for SPS reasons
A82 Testing requirements for SPS reasons	A82 Testing requirements for SPS reasons	A31 Labelling requirements for SPS reasons	A31 Labelling requirements for SPS reasons	P33 Licensing, permit or registration requirements to export
B31 Labelling requirements for TBT reasons	A14 Authorization requirement for SPS reasons for importing certain products	B31 Labelling requirements for TBT reasons	B31 Labelling requirements for TBT reasons	E1 Non-automatic import licensing procedures for reasons other than SPS or TBT

Source: UNCTAD compilation based on UNCTAD TRAINS data.

3.2 Seafood processing

The sector includes industrial fish processing: fish that has gone through substantial transformation, mechanical or chemical operations. Products can be fit for human consumption, animal feed or fertilizer production.[32] The initial phases of fish processing include washing, degutting, salting, fermentation, filleting, drying and smoking (Research and Markets, 2019). Seafood can be further processed into various forms, namely balls, sticks, nuggets, cakes and pastes which are by-products of traditional items, such as fillets. It can also be transformed into oil, flours, processed meals, or feed. Additionally, manufacturers are using microwave technology to temper frozen blocks of fish, and to facilitate easy cutting for fish stick and portion production (Allied Market Research, 2019).

UNCTAD's SOEC clusters seafood products into:

- Prepared and preserved fish, crustaceans and molluscs
- Flours, meals and pellets, of fish, crustaceans, molluscs or other aquatic invertebrates
- Fats and oils of fish or marine mammals, whether or not refined
- Processed meals and dishes.

Trade trends

The sector witnessed export growth, reaching $55 billion in 2018, but lost ground over most of the period 2015 to 2018. The largest subsector in 2018 was Prepared and preserved fish,

[32] Definitions based on OECD, 2016 and FAO's definition on fish processing – http://www.fao.org/flw-in-fish-value-chains/value-chain/processing-storage/en/.

crustaceans and molluscs, and the best performing subsector was Flours, meals and pellets, of fish or crustaceans, molluscs, or other aquatic invertebrates which not only grew over the entire period but saw double-digit growth in 2017. This subsector also increased its market share in the Seafood processing sector (from 34 per cent in 2015 to 39 per cent in 2018). The distribution and growth path of the four subsectors is presented in Figure 22.

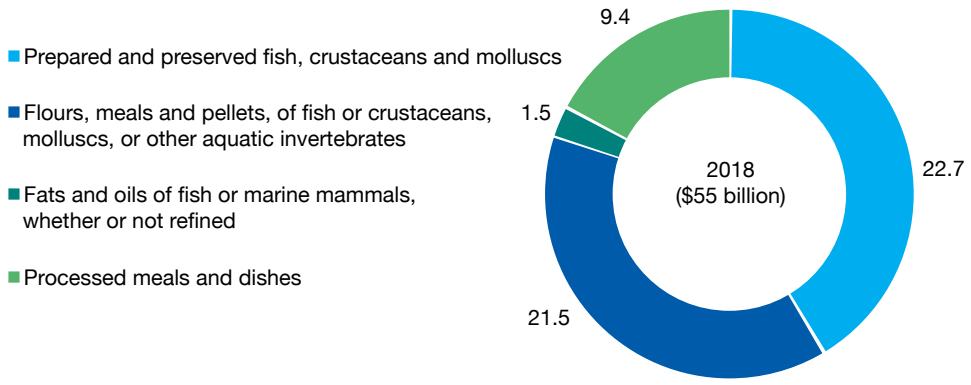


Figure 22. Seafood processing export composition by subsector, 2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

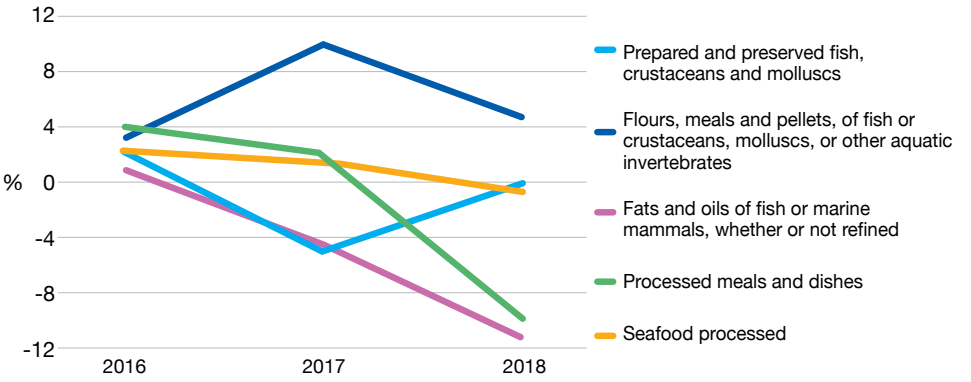


Figure 23. Seafood processing export growth by subsector, 2015–2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

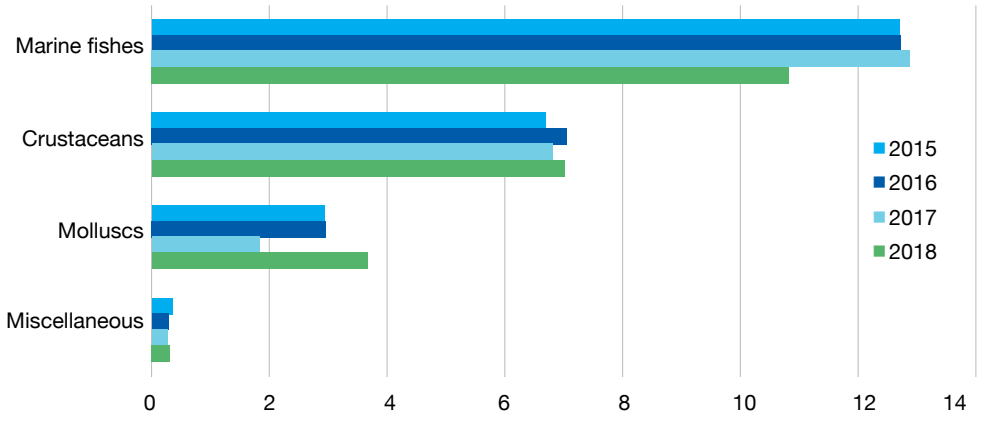
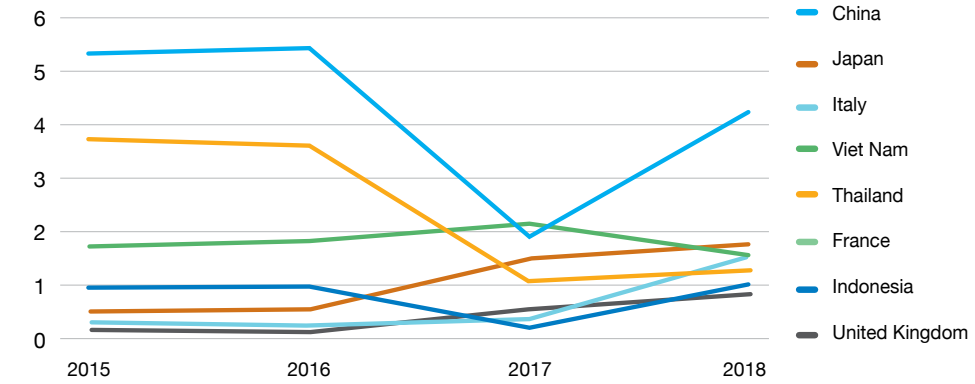


Figure 24. Prepared and preserved fish, crustaceans and molluscs, export composition and trends by subsector, 2015–2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

Figure 24 shows the export composition of the Prepared and preserved fish, crustaceans and molluscs subsector for the 2015 to 2018 period. At the country level, six out of 11 leading exporters are developing economies, but most of these witnessed negative growth during the period 2015 to 2018. Figure 25 provides the trends.

Figure 25. Leading exporters of prepared and preserved fish, crustaceans and molluscs, 2015–2018 ($ billion)

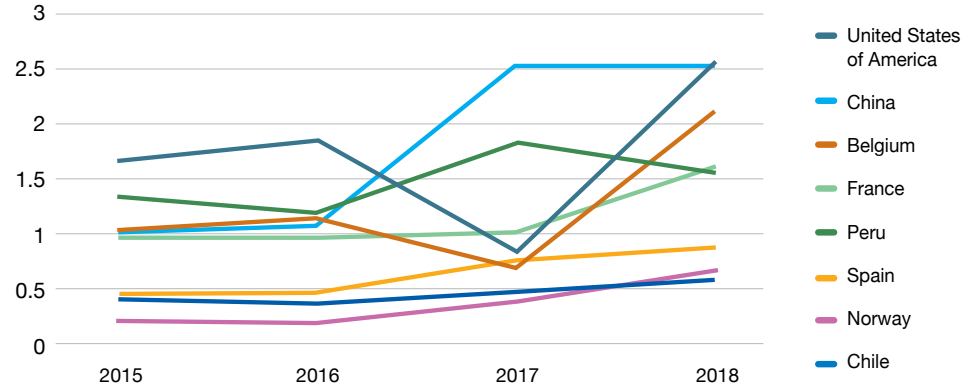


Source: UNCTAD calculations based on UNCTADStat data (2020).

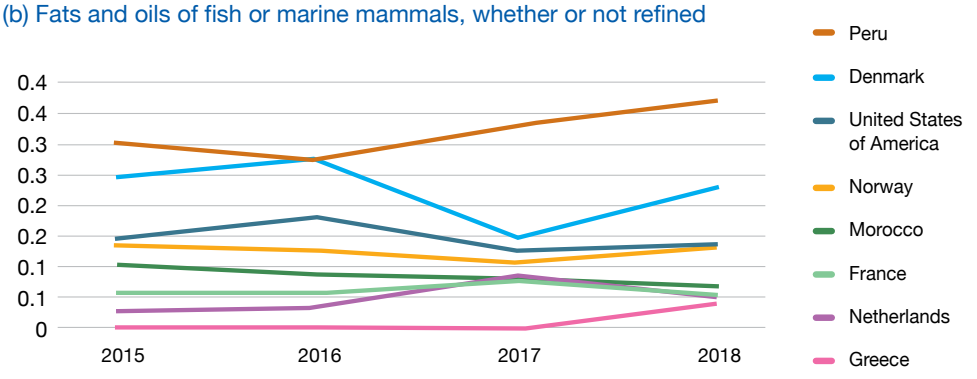
Now the focus shifts to the other three subsectors: Flours, meals and pellets, of fish or crustaceans, molluscs, or other aquatic invertebrates; Fats and oils of fish or marine mammals, whether or not refined; and Processed meals and dishes. At the country level, four of the ten leading exporters of the three subsectors are developing countries. Among the four developing countries, Peru stands out: in 2017 and 2018 it was the leading exporter of Fats and oils of fish or marine mammals, whether or not refined. Across subsectors, Flours, meals and pellets of fish, crustaceans and molluscs or other aquatic invertebrates is where a higher number of developing countries were among the leading exporters: seven out of the 13 leading exporters in 2018 were developing countries. As for developed countries, the United States of America and western European economies were the leading exporters in the three subsectors. Figure 26 provides the trends of the main exporters in 2018, by subsector.

Figure 26. Leading exporters of other seafood processing subsectors by country, 2015–2018 ($ billion)

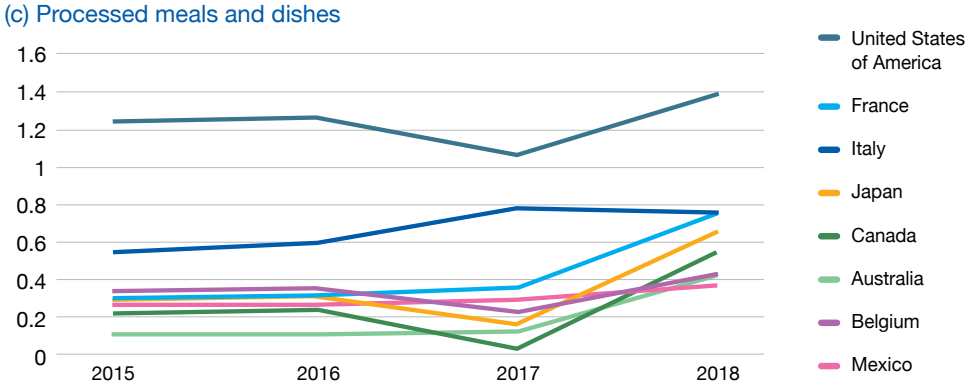
(a) Flours, meals and pellets of fish, crustaceans and molluscs or other aquatic invertebrates



(b) Fats and oils of fish or marine mammals, whether or not refined



(c) Processed meals and dishes



Source: UNCTAD calculations based on UNCTADStat data (2020).

Market drivers and market access

Market drivers

The sector's growth responds to both demand and supply forces. Consumption expansion is associated with growing population and urbanization, rising incomes and higher availability of processed seafood. Supply of processed seafood is driven by multiple factors, including improved distribution channels and transport technologies (e.g., state of the art refrigeration enables distribution of fish over long distances), better utilization of resources, development of new products, reduced wastage, and increased production of seafood (FAO, 2020; Allied Market Research, 2019).

The expansion of fish processing has contributed to the better utilization of fish by-products, the production of which has increased and is estimated to represent 70 per cent of processed fish (FAO, 2020). Fish by-products, such as heads, frames, fillet cut-offs and skin, are no longer thrown away as waste but are increasingly used as inputs for the manufacturing of new products. In addition to being used directly in fishmeal and fish oil as feed for aquaculture, livestock, pets or animals reared for fur production, or inputs in silage and fertilizers, fish by-products are now being used directly as food or processed into fish sausages, cakes, snacks, jelly, soups, sauces and other products for human consumption. Further, they are used for dietetic products (chitosan) and biofuel and biogas (FAO, 2020).

The reasons for the development of the sector differ across countries and regions but also across the level of development of countries. For example, FAO (2020) finds that:

- Latin America followed by Asia and Europe have the highest share of fish utilized for the production of fishmeal and fish oil.
- In Africa, the proportion of cured fish is higher than the world average.
- In Europe and North America, about two-thirds of the fish for human consumption is used in frozen and prepared and preserved forms.
- In more developed economies, fish processing has diversified, particularly into high value-added products, such as ready-to-eat meals (see above).
- In many developing countries, fish processing is evolving from traditional methods to more advanced value-adding processes, depending on the commodity and market value.

Challenges

For most exporters, the main challenges lie in access to technology, compliance with SPS measures, other NTMs, and tariffs. The latter two are discussed below. As for technology, this includes access to storage and transportation for ensuring the preservation of products and compliance with sanitary measures. Technology is also critical for productivity and the development of new products.

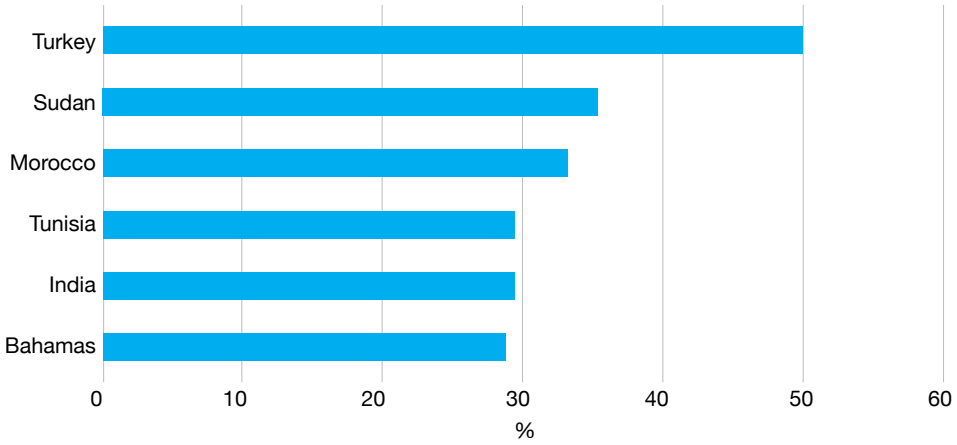
Seafood processing machinery and equipment and state-of-the-art transportation technology involves access to information, capacity building and finance.

Market access

Tariffs

Relative to the Marine fisheries sector, average MFN tariffs tend to be higher for processed fish. This can be attributed to the desire of countries to protect their local processing industry and to promote domestic value addition. Tariffs on processed seafood products average 13 per cent, the highest rate of all sectors of the oceans economy. Turkey, the Sudan, Morocco, Tunisia and India have the highest average tariffs for processed seafood (Figure 27). Of these, Morocco and India have strong national policies geared towards the development of their seafood sector, which may explain the high tariffs.

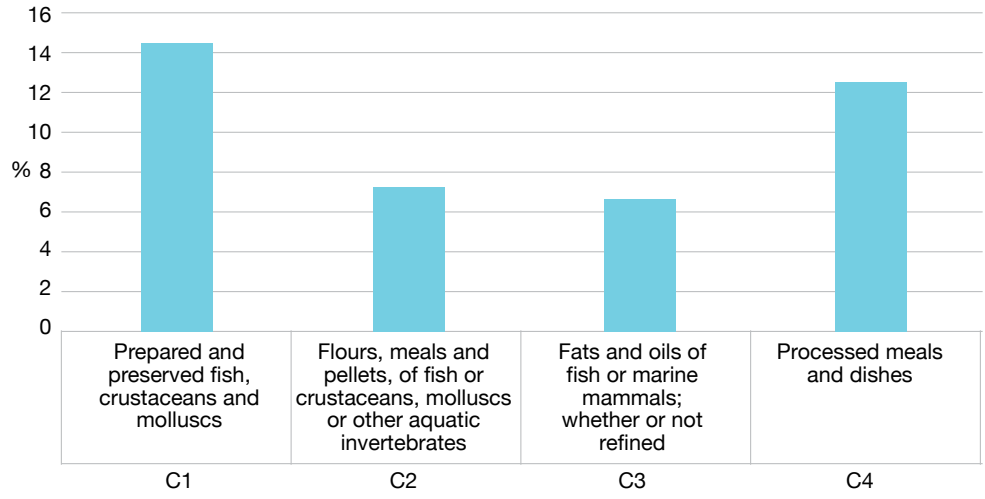
Figure 27. Highest tariffs by country, 2018



Source: UNCTAD calculations based on WITS, TRAINS data (2020).

Amongst the various subsectors, C1 Prepared and preserved fish, crustaceans and molluscs, and C4 Processed meals and dishes, face the highest average tariffs. In contrast, tariffs in subsector C2 Flours, meals and pellets, of fish or crustaceans, molluscs or other aquatic invertebrates and C3 Fats and oils of fish or marine mammals, whether or not refined, are relatively low (Figure 28). Products facing a tariff of over 20 per cent in a large number of countries are indicated in Table 6. Most of these belong to the subsector C1 Prepared and preserved fish, crustaceans and molluscs.

Figure 28. Average tariffs by seafood processing subsectors, 2018



Source: UNCTAD calculations based on WITS, TRAINS data (2020).

Table 6. Seafood processing products at HS six-digit level with tariffs above 20 per cent, 2018

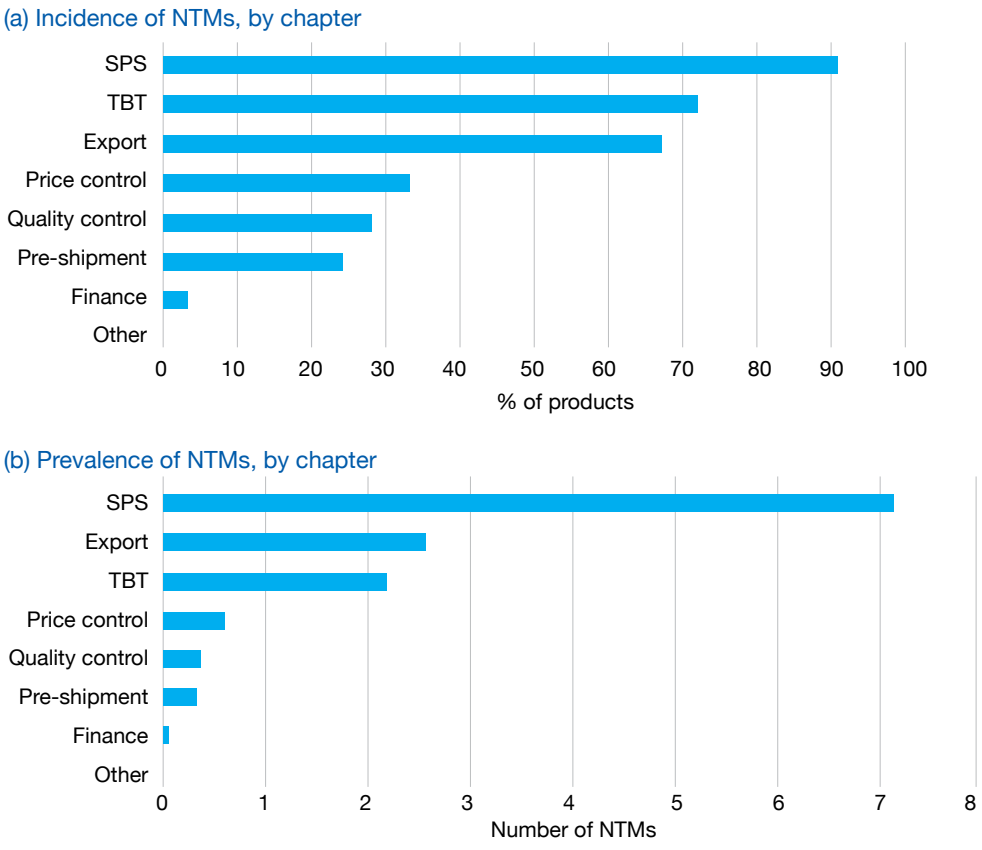
HS6	Product	SOEC subsector	Number of countries
160418	Shark fins, prepared or preserved	C1 Prepared and preserved fish, crustaceans and molluscs	91
30639	Crustaceans live, fresh, chilled or boiled in water – other, including flours, meals and pellets, of crustaceans, fit for human consumption	C2 Flours, meals and pellets, of fish or crustaceans, molluscs, or other aquatic invertebrates	84
30699	Crustaceans, dried, salted or in brine, smoked – other, including flours, meals and pellets, of crustaceans, fit for human consumption	C2 Flours, meals and pellets, of fish or crustaceans, molluscs, or other aquatic invertebrates	83
160562	Sea urchins, prepared or preserved	C1 Prepared and preserved fish, crustaceans and molluscs	81
160563	Jellyfish, prepared or preserved	C1 Prepared and preserved fish, crustaceans and molluscs	81

Source: UNCTAD calculations based on WITS, TRAINS data (2020).

Non-tariff measures

It is estimated that 90 per cent of imported processed seafood faces at least one SPS measure and almost 70 per cent is subject to at least one TBT measure (Figure 29). Export requirements are also commonly applied, with an incidence of nearly 70 per cent. Both price control and quantity control measures are applied to processed seafood. Over 30 per cent of imported processed seafood face such measures. Finance and other measures are less common. On average, seven NTMs are applied to each imported product under this chapter. The number of TBT measures applied is less prevalent, with a score of nearly two measures per product. The prevalence of other import NTMs is significantly lower, i.e., less than one NTM per imported product (Figure 29). On the export side, nearly three export measures are applied per product.

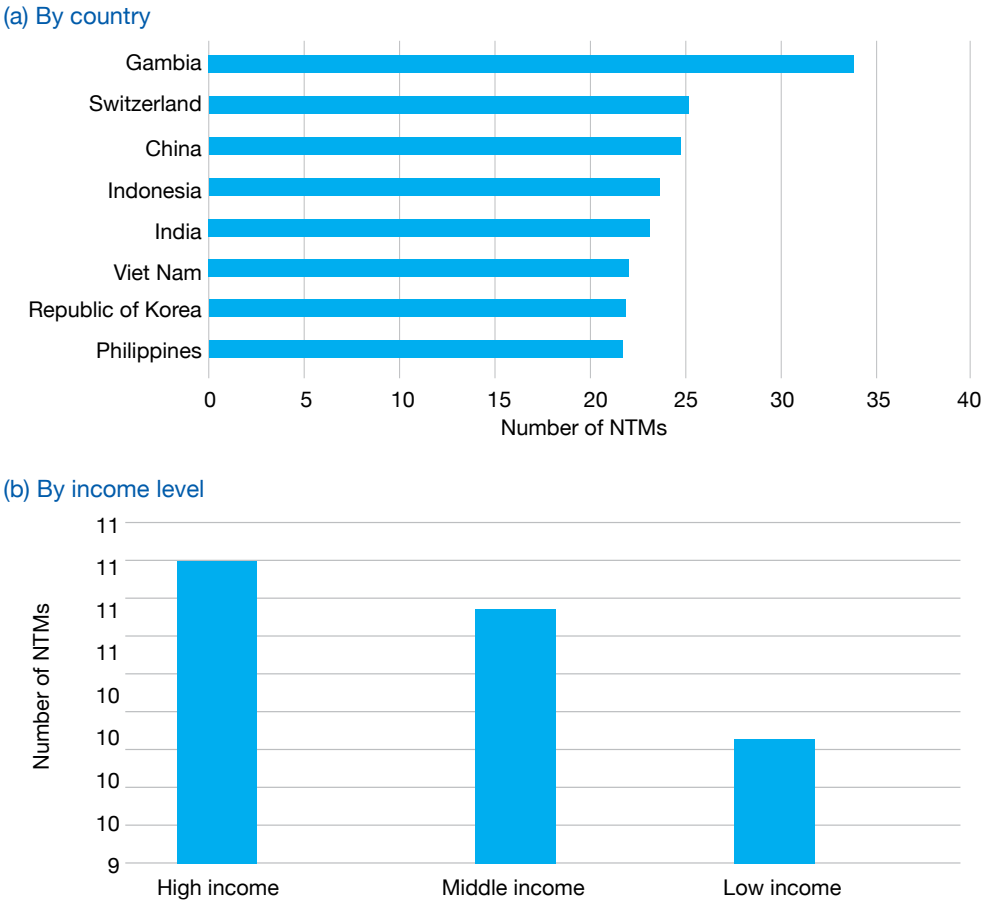
Figure 29. Incidence of NTMs on seafood processed products by chapter



Source: UNCTAD calculations based on UNCTAD TRAINS data.

The Gambia, Switzerland, China, India, the Republic of Korea and Viet Nam use the maximum number of import measures per product in the Seafood processing sector. This is similar to the Marine fisheries sector. Indonesia too applies several NTMs on imported processed seafood, as opposed to its more modest use of NTMs for Marine fisheries. High income countries tend to apply a higher number of import-related NTMs per product than low- and middle-income countries, although the margins are small (Figure 30).

Figure 30. Prevalence of NTMs by country and income level: import measures



Source: UNCTAD calculations based on UNCTAD TRAINS data.

Of the different subsectors, prevalence of NTMs is highest in C3 Fats and oils of fish or marine mammals, whether or not refined, with nearly ten import NTMs applied per product. C1 Prepared and preserved fish, crustaceans and molluscs and C4 Processed meals and dishes are least regulated, with fewer than one import NTM applied per product (Figure 31).

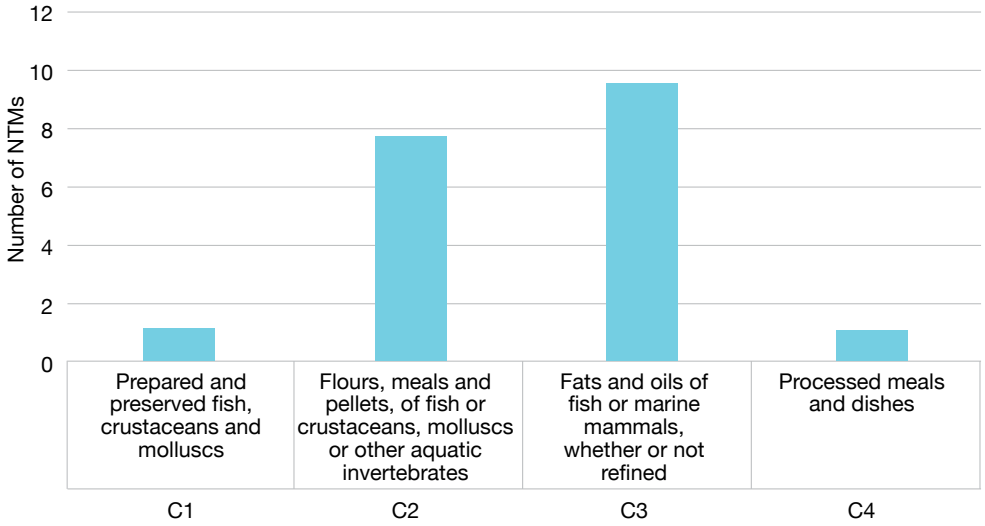


Figure 31. Prevalence of NTMs by subsector: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS data.

Table 7 lists the most commonly used NTMs for each Seafood processing subsector. Labelling, authorization and inspection requirements for SPS reasons are most commonly applied by countries. TBT measures are applied by relatively fewer countries and labelling requirements are most commonly applied.

Table 7. Most commonly used NTMs by seafood processing subsector

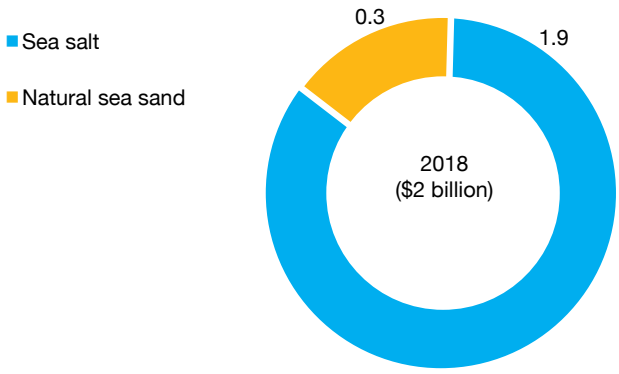
C1. Prepared and preserved fish, crustaceans and molluscs	C2. Flours, meals and pellets, of fish or crustaceans, molluscs, or other aquatic vertebrates	C3. Fats and oils of fish or marine mammals, whether or not refined	C4. Processed meals and dishes
B31 Labelling requirements for TBT reasons	A14 Authorization requirements for SPS reasons	A83 Certification requirements for SPS reasons	A83 Certification requirements for SPS reasons
A14 Authorization requirements for SPS reasons	A83 Certification requirements for SPS reasons	B31 Labelling requirements for TBT reasons	A14 Authorization requirements for SPS reasons
A83 Certification requirements for SPS reasons	A84 Inspection requirements for SPS reasons	A14 Authorization requirements for SPS reasons	A84 Inspection requirements for SPS reasons
A31 Labelling requirements for SPS reasons	B31 Labelling requirements for TBT reasons	A82 Testing requirements for SPS reasons	B31 Labelling requirements for TBT reasons
A84 Inspection requirements for SPS reasons	A31 Labelling requirements for SPS reasons	A84 Inspection requirements for SPS reasons	A31 Labelling requirements for SPS reasons

Source: UNCTAD TRAINS data (2020).

3.3 Sea minerals

The sector includes the production, extraction and processing of two minerals: sea salt and natural sea sand. The structure and characteristics of the two subsectors are different. These are therefore discussed separately.

Figure 32. Sea minerals export composition by subsector, 2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Sea salt

Sea salt is usually obtained by either open-air solar evaporation, or by a quicker, vacuum evaporation process. Although these processes are typically applied to natural brine, rock salt can also be transformed into brine and hence those two processes may apply.

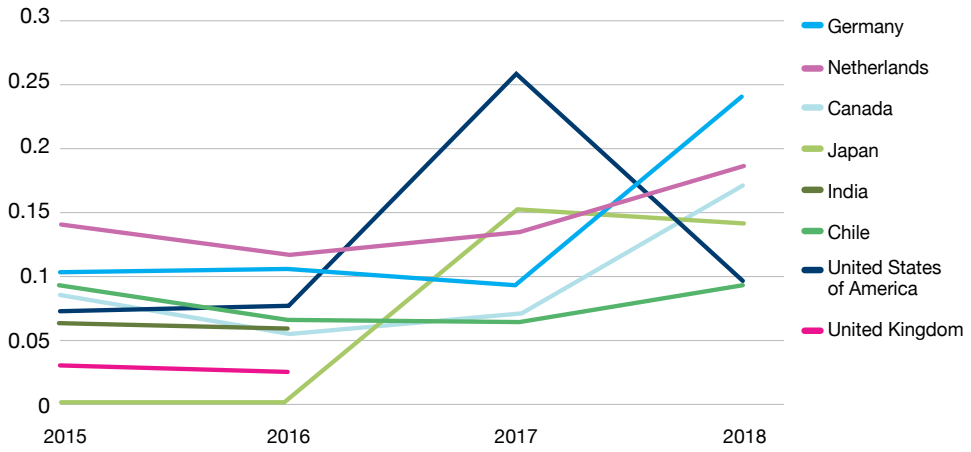
The source of the salt, its grade, production technique and market demand are what determine the price, logistics and production costs. For example, in 2016, prices of salt in the United States of America were $182/ton for vacuum and open pan salt, $89/ton for solar salt and $50/ton for rock salt (Perks, 2016). Rock salt extraction is a terrestrial mining activity rather than an oceans economy activity.

The choice of source depends on the use of the salt. Whereas salt is widely known for its use as a commodity for human consumption, it has approximately 14,000 applications, most of which are industrial. Examples include chemical processing, de-icing, water treatment, as a detoxifying agent, antioxidant agent, for oil and gas production, agriculture and for the manufacture of products such as paper pulp, plastics, cosmetics and animal feed, among others.

Trade trends

Trade data estimates reveal that in 2018, the export value of the Sea salt subsector was approximately $1.9 billion. The subsector's CAGR for the period 2015 to 2018 was 20 per cent; the highest annual percentage change for that period was observed in 2017 (50 per cent). At the regional level, Europe and Asia were the best performers. The highest growth during the period was observed among Asian countries, notably LDCs. In contrast, the lowest growth rate was observed in LDCs from Africa. At the country level, five European countries are responsible for 31 per cent of global exports of sea salt. These are Germany, the Netherlands, the United Kingdom, Belgium and France (Figure 33). Out of the 12 world leading exporters of sea salt, only four are developing countries.

Figure 33. Leading exporters of sea salt, 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020). Data are missing for India and the United Kingdom.

Market drivers

Growth in the sector is most likely a response to increased demand for industrial salts, notably from the chlor-alkali industry (used in manufacturing), de-icing (due to increased demand for magnesium chloride) and water treatment systems (notably for clean water). These industries expanded over the past few years and account for the largest share of industrial salts. They are also likely to use brine salt which is mainly utilized in chemical processing, the largest segment of the salt industry, estimated to account for more than 50 per cent (Grand View Research, 2017).

The industry has also benefited from growing technological innovations such as vacuum pan technology which allows the production of high purity products with applications in hospitals, food plants, the medical industry, circuit board manufacturing and water softening. This technology is expected to witness robust growth. The overall salt market (within and across countries) was valued at $12.7 billion in 2016 (Grand View Research, 2017).

Challenges

Public information about the size and trends of the global sea salt market is very limited. Most available data do not distinguish between the two sources, i.e., between mined rock salt and natural brine (sea water and salty lakes), even though the industries dedicated to the extraction of these two types of salts are very different in terms of production, price and demand.

Lack of adequate data means that harmful production practices go unnoticed. Only some producers have the necessary knowledge to reduce costs, increase production sustainably, and diversify production or markets. It also means that regulations to improve the business environment and promote sustainability cannot rely on specific data. This leads to lost opportunities in terms of investment and sector development.

Natural sea sand

Natural sea sand is sourced from shores (shallow nearshore or beach areas) and offshore deposits (Otay et al., 2000). While both sources are common in developed and developing countries, offshore dredging is most common in developed economies due to the cost of specialized equipment and the special environmental permits required. New technologies, however, are rendering offshore dredging operations economically more attractive (United Nations, 2016).

Natural sea sand is used for land reclamation (e.g., expansion of territory),[33] environmental services (e.g., reconstruction of beaches to combat coastal erosion), and by the construction industry.[34] In the case of sand extracted from coastlines where granite or basalt has accumulated on beaches, sand is also used in jewellery, as pigments in paints, plastics, paper, foods, and in electronics (UNEP, 2019b).

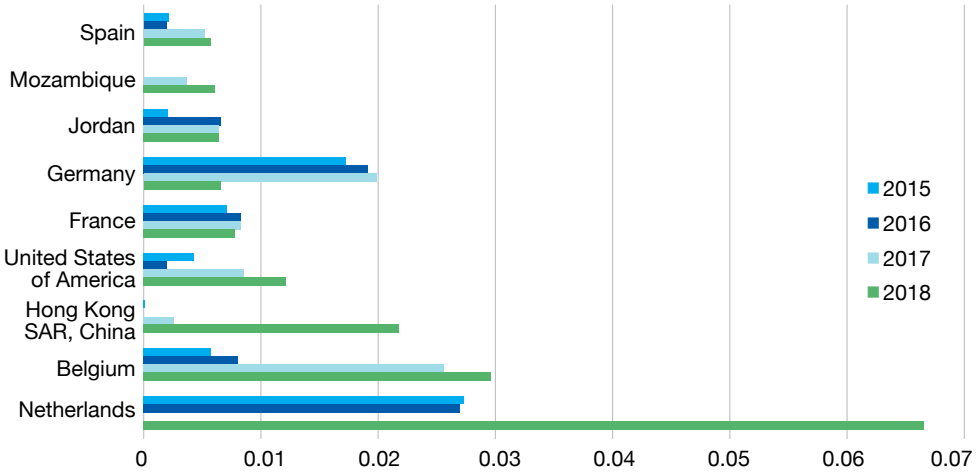
[33] This is the case, for instance, of Singapore. See Global Witness, 2010.

[34] The exact share across sand application is unknown, yet it is estimated that about 50 per cent of all sand types (land-based or marine-based) is used for construction.

Trade trends

Exports of marine sand were estimated at $0.3 billion in 2018.

Figure 34. Leading exporters of natural sea sand 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

In terms of market share, European developed countries accounted for 63 to 69 per cent of global exports of Natural sea sand between 2015 and 2017, although their market share declined in 2018 to 48 per cent. In 2018, developing countries from Asia substantially increased their market share: from 18 per cent (average between 2015 and 2017) to 44 per cent. Because sand is primarily traded regionally (due to its weight and the logistics required), changes in market share primarily mirror the exponential growth of intra-regional trade in Asia. The exports of Natural sea sand in 2018 were dominated by nine economies which together concentrate about 82 per cent of total exports. Out of the nine, the Netherlands, Belgium and Hong Kong SAR, China exported about 59 per cent of global sea sand (Figure 34).

Market drivers

The increase in demand for Natural sea sand has to do with several factors, most notably, demand for sand by the manufacture and services industries, reserves depletion, and stringent regulations in land-based sand deposits (United Nations, 2016).

Marine sand mining activities are regulated by global, regional and national legislation. At the international level, the United Nations Convention on the Law of the Sea, Environmental Impact Assessment Directive (85/337/EEC), and Deep Sea Mining Act 2014 are among the main regulations on marine sand mining activity.[35] Furthermore, the private sector is taking voluntary actions on sand and sustainability. For example, the marine industry of the United Kingdom published a practice guidance for marine aggregate extraction in 2017 (UNEP, 2019b). Governments and private businesses aiming to enter or expand marine sand markets can use existing frameworks to ensure the long-term growth and sustainability of the subsector.

Challenges

Developing countries and LDCs face considerable challenges to achieve a sustainable marine sand industry, as many cope with illegal sand mining. Countries such as Indonesia and Malaysia, for example, banned exports of sands during certain periods because of illegal extraction and its negative impact on the environment. In other parts of the globe, such as Tarawa, Kiribati, illegal beach mining has been tackled by recognizing and promoting other sources of revenue (United Nations, 2016). Another factor that may constrain the development of the sector is the implementation of clean mining technology which may be difficult because of the costs involved

[35] For more on marine conventions and the impact of marine sand mining in the environment see UNEP (2019b).

and the expertize required for environmental restoration (Gavriletea, 2017). Several countries have weak monitoring systems, environmental legislation, and regulations related to sand mining processes. In most cases, the absence of adequate information and shortage of tools and human resources to properly enforce environmental regulations are also a concern (Gavriletea, 2017).

The development of the Natural sea sand subsector can have a sustainable social and economic impact, but only if it goes hand in hand with appropriate environmental measures. Failing to do so will not only deplete sand reserves but take a heavy toll on the tourism industry, fisheries, the environment and coastal livelihoods. Pathways towards the sustainable development of the subsector exist, such as by reducing consumption. This could be achieved by reducing over-building and over-design, using recycled and alternative materials to sand in the construction sector, and reducing impacts through implementing existing standards and best practices (UNEP, 2019b).

Market access

Tariffs

The average applied MFN tariffs in this sector are approximately 5 per cent, relatively lower than Marine fisheries and Seafood processing. Bhutan, Viet Nam and the Bahamas have the highest average MFN tariff. Average applied MFN tariffs for D1 Sea salt and D2 Natural sea sand are close to 7 per cent and 3.7 per cent, respectively (Figure 35). Tariffs above 20 per cent in the two subsectors are observed in 21 and four countries, respectively (Table 8).

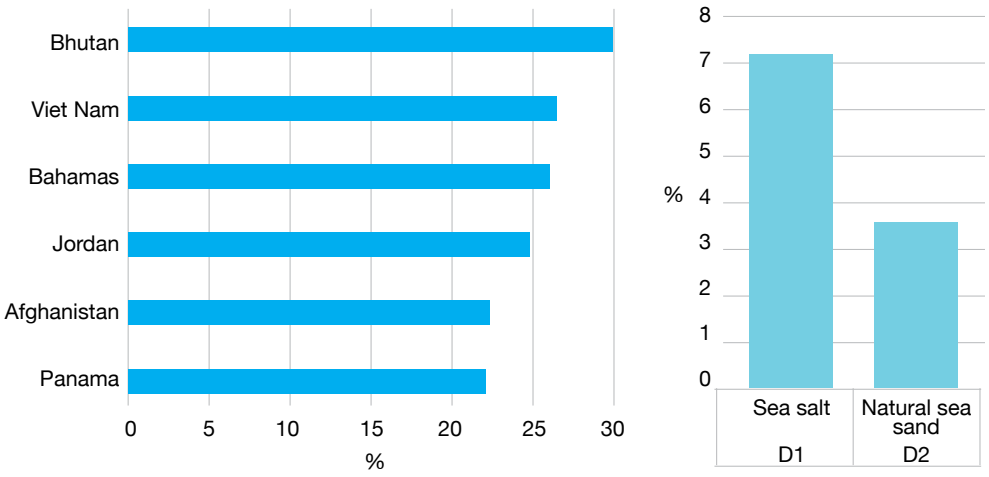


Figure 35. Highest tariffs in sea minerals by country and average tariffs by subsector, 2018

Source: UNCTAD calculations based on WITS, TRAINS data.

Table 8. HS6 products with tariffs above 20 per cent, 2018

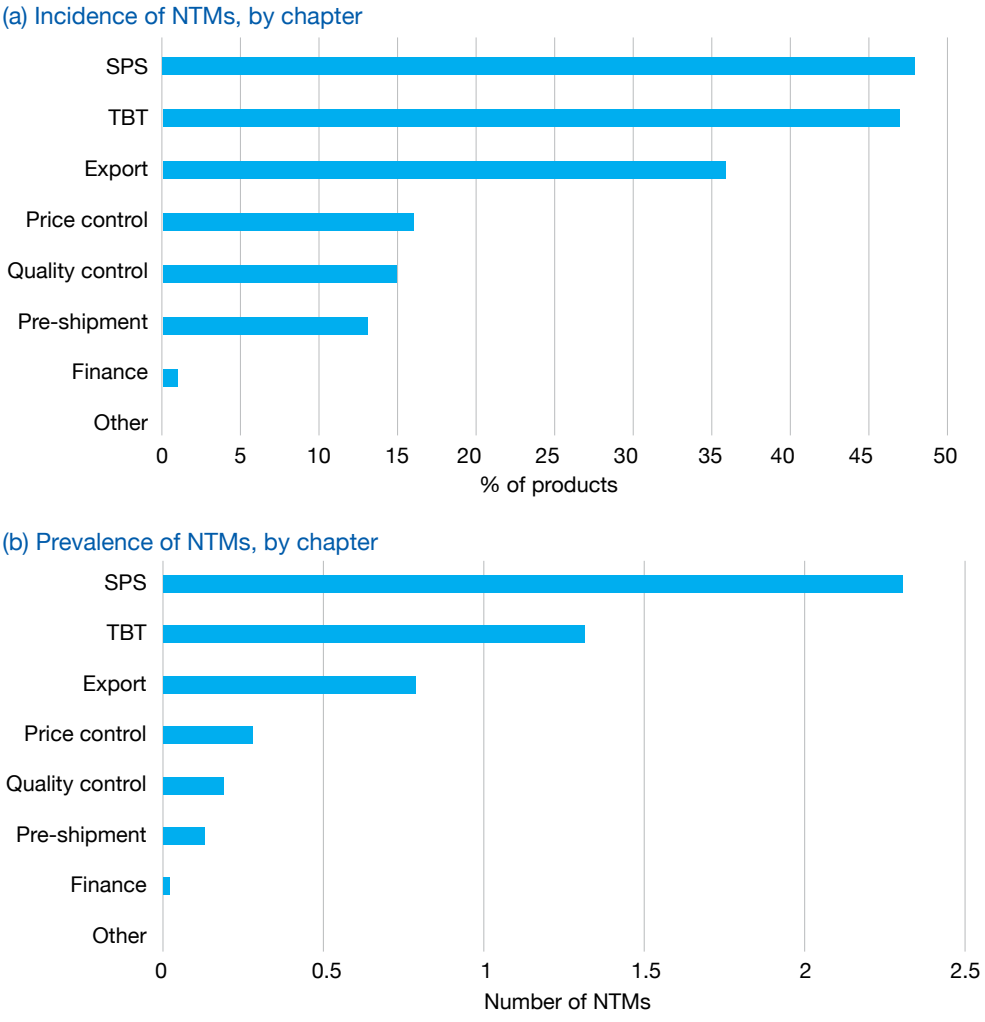
HS6	Product	OE subsector	Number of countries
250100	Salt (including table salt and denatured salt) and pure sodium chloride, whether or not in aqueous solution or containing added anti-caking or free-flowing agents	D1 Sea salt	21
250590	Natural sands of all kinds, whether or not coloured (excluding silica sands, quartz sands, gold- and platinum-bearing sands, zircon, rutile and ilmenite sands, monazite sands, and tar or asphalt sands)	D2 Natural sea sand	4

Source: UNCTAD calculations based on WITS, TRAINS data.

Non-tariff measures

In the Sea minerals sector, the percentage of products subject to SPS and TBT measures is lower relative to the Marine fisheries and Seafood Processing sectors. Only about 50 per cent of products are subject to import NTMs, and less than 40 per cent are subject to export measures. This is explained by the low value-added of the product codes, their low likelihood to pose a severe health concern compared to fish and fish products, and an apparent lack of regulation or low enforcement of environmental regulations underpinning the sector. The average number of NTMs applied per product is also low at nearly 2.5 SPS measures and approximately 1.5 TBT measures per product (Figure 36). Less than one export measure is applied per product, and the prevalence of other forms of NTMs is negligible.

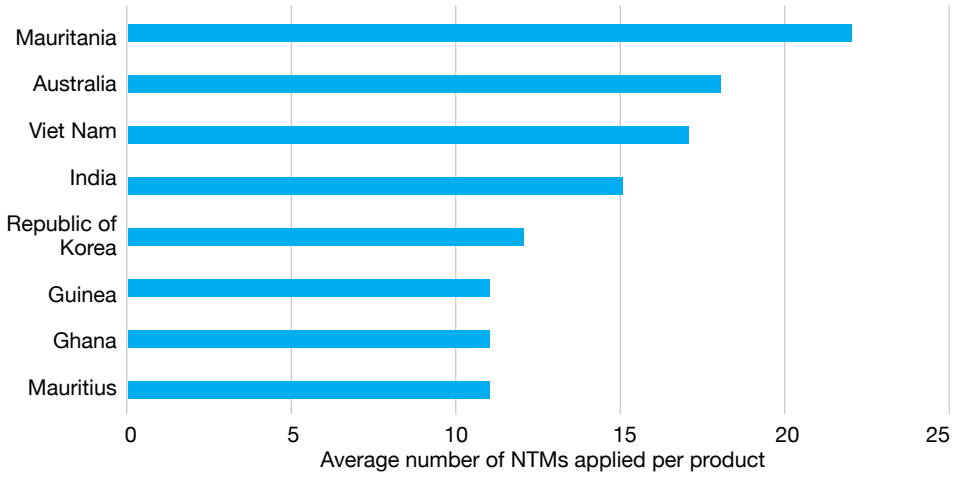
Figure 36. Incidence of NTMs on sea minerals by chapter



Source: UNCTAD calculations based on UNCTAD TRAINS data.

Middle income countries tend to apply the highest average number of import-related NTMs per product in this sector. Prevalence of import NTMs in high income countries is the lowest at approximately five import measures applied per product. The main exceptions are Mauritania and Australia, which are amongst the largest users of import NTMs on sea minerals (Figure 37). Of these, Mauritania uses an average of as many as 22 import NTMs per product.

(a) By country



(b) By income level

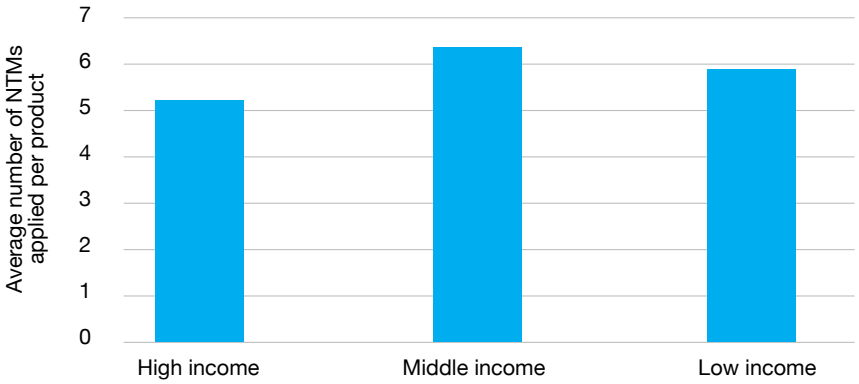


Figure 37. Prevalence of NTMs by country and income level: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS data.

As far as the subsectors are concerned, Sea salt is subject to an average of over five import NTMs per product, while the prevalence of NTMs on Natural sea sand is considerably lower, with 1.5 measures applied per product (Figure 38). Table 9 indicates that the most commonly used NTMs for Sea salt are labelling requirements for SPS and TBT reasons, as well as maximum residue limits. For Natural sea sand, export measures tend to be the most commonly used, while the use of TBT-related restrictions is also common.

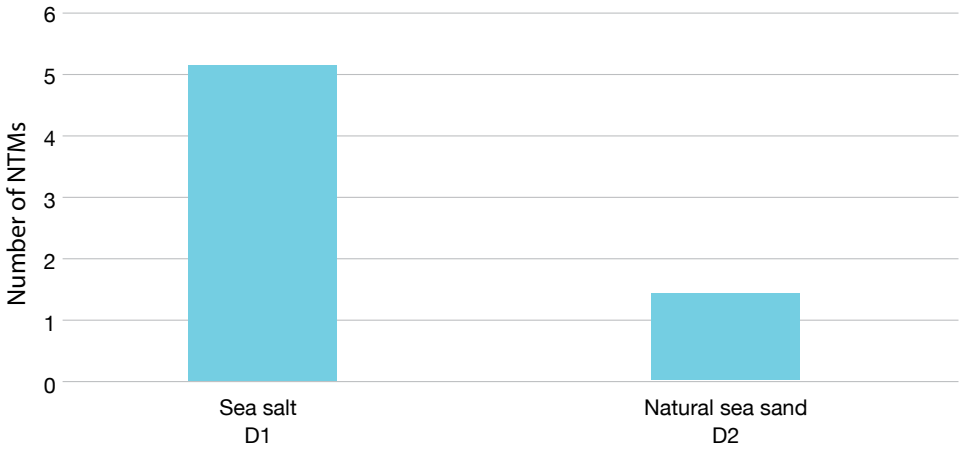


Figure 38. Prevalence of NTMs by subsector: import measures

Source: UNCTAD's calculations based on UNCTAD TRAINS data.

Table 9. Most commonly used NTMs by subsector

D1 Sea salt	D2 Natural sea sand
B31 Labelling requirements for TBT reasons	P33 Licensing, permit or registration requirements to export
A31 Labelling requirements for SPS reasons	B31 Labelling requirements for TBT reasons
A21 Tolerance limits for residues of or contamination by certain (non-microbiological) substances	B82 Testing requirements for TBT reasons
A22 Restricted use of certain substances in foods and feeds and their contact materials	P11 Authorization or permit requirements to export, for technical reasons
A82 Testing requirements for SPS reasons	B84 Inspection requirements for TBT reasons

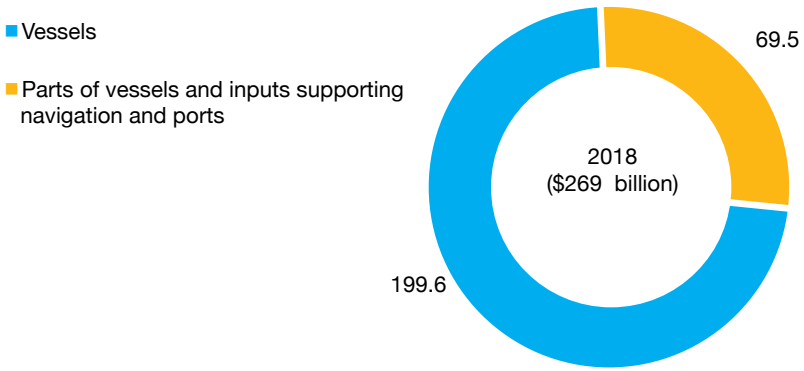
Source: UNCTAD TRAINS data (2020).

3.4 Ships, port equipment and parts thereof

The sector includes all products that are directly relevant to maritime transport and ports, such as vessels and boats (excluding warships), cargo handling equipment and related supporting appliances, marine equipment and materials for navigational aid and ports (for instance, advanced sensing and communications, data management and informatics) and parts of vessels and other inputs (such as valves, cables, sensors and ship materials).[36] UNCTAD's SOEC clusters these industries into:

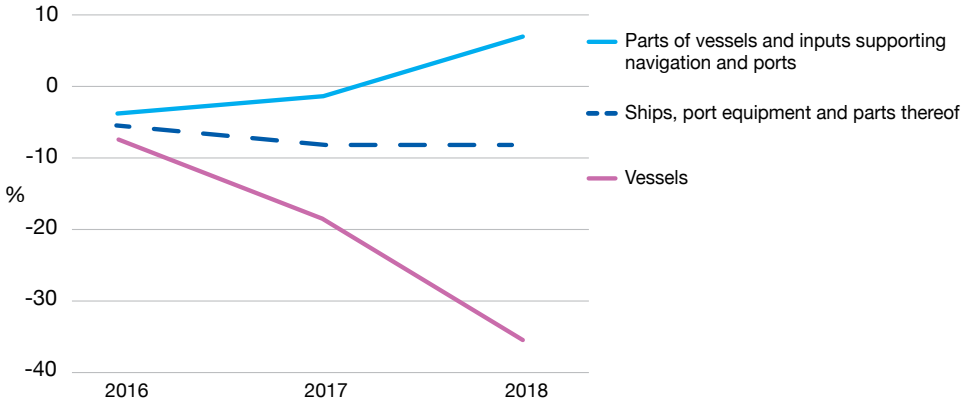
- Vessels
- Parts of vessels and inputs supporting navigation and ports.

Figure 39. Ships, port equipment and parts thereof export composition by subsector, 2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Figure 40. Ships, port equipment and parts thereof export growth by subsector, 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

[36] Based on UNCTAD (2019b); WTO (2010b) and advice from experts in the maritime transport and ports sector.

The following text presents the export trends of the two subsectors and the market drivers and market access levels for the sector as a whole.

Vessels

Trade trends

The ship industry is characterized by a relatively high diversity of vessels. It includes fishing vessels, pleasure and sporting boats, transport vessels and floating structures for commercial marine logistics (such as bulkers, tankers, containerships, offshore vessels and passenger ships).

Exports of vessels declined significantly between 2015 and 2018 and the CAGR for the period was –21 per cent. The export value of vessels in 2018 was estimated at $66.5 billion (Figure 41). This declining trend can largely be attributed to vessels used for transport and logistic purposes. By contrast, vessels for pleasure and sporting boats followed an oscillating but increasing trend between 2015 and 2018 (Figure 42). Exports of fishing vessels showed a small decline of about –2 per cent, possibly due to WTO negotiations on fisheries subsidies and measures to reduce fishing capacity in certain countries such as the European Union and, to a lesser extent, China (FAO, 2020).

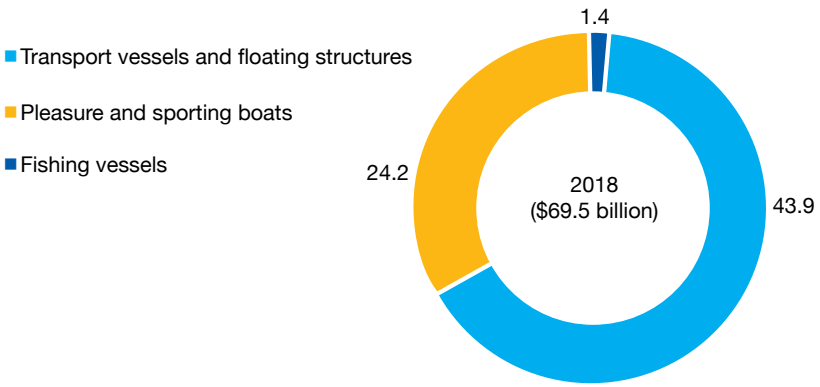


Figure 41. Vessels export composition by subsector, 2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

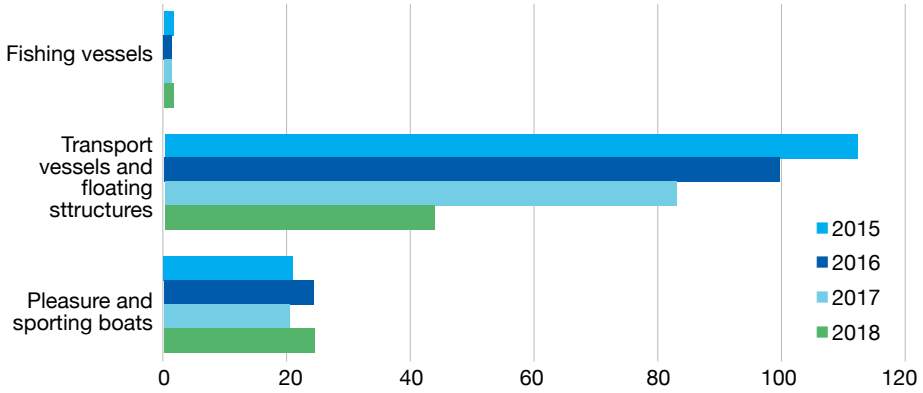
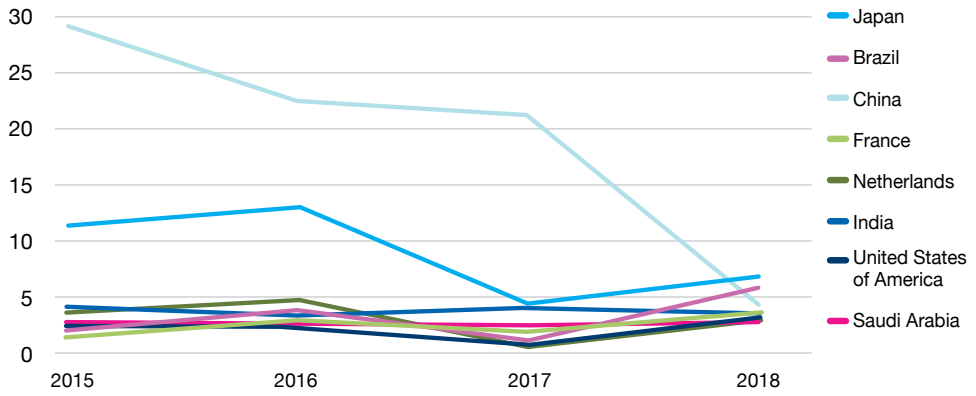


Figure 42. Vessels export trends by subsector, 2015–2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

The leading exporters in 2018 were Japan (10 per cent), Brazil (8 per cent) and China (6 per cent). Seventeen countries accounted for 71 per cent of exports. Figure 43 depicts the export trends at the country level. The market drivers of the subsector are discussed under "Market drivers and market access".

Figure 43. Leading exporters of vessels, 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

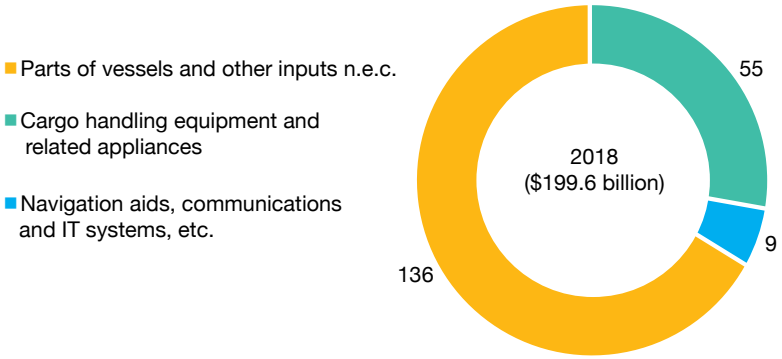
Parts of vessels and inputs supporting navigation and ports

The shipping industry requires a vast amount of machinery and appliances to operate. The sustainable oceans economy classifies these into:

- Cargo handling equipment and related supporting appliances (e.g., cranes, forklifts and other equipment and machinery)
- Navigation aids, communications and IT systems appliances and equipment, for maritime transport and ports
- Parts of vessels and other inputs n.e.c. specific to maritime transport and ports.

Exports of Parts of vessels and inputs supporting navigation and ports reached $199.6 billion in 2018. The global CAGR of its three subsectors for the period 2015 to 2018 was positive. The best performer was Cargo handling equipment and appliances with a CAGR reaching 2 per cent between 2015 and 2018. The second-best performing subsector was Parts of vessels and other inputs n.e.c. specific to maritime transport and ports. Although its exports CAGR was close to nil, the subsector showed lower regional concentration among developed countries. As for Navigation aids, communications and IT systems appliances, its CAGR 2015–2018 was 0.1 per cent, and a negative CAGR is observed in most regions (Figure 44). The traditional leading exporters of the subsectors are China, Japan, the United States of America and Mexico.

Figure 44. Parts of vessels and inputs supporting navigation and ports export composition, 2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

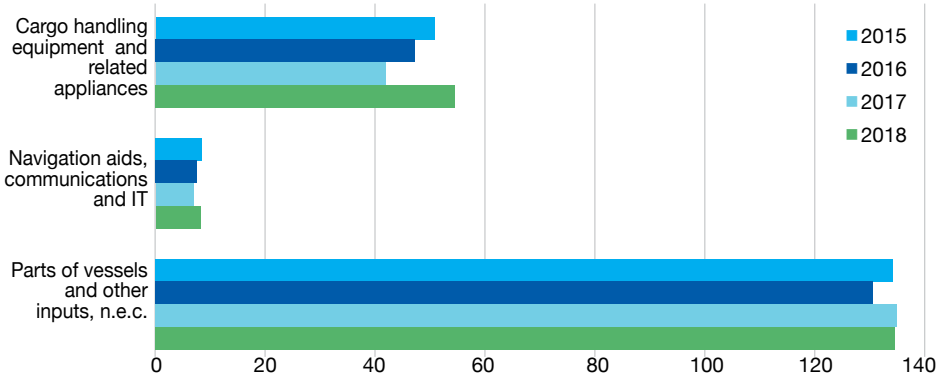
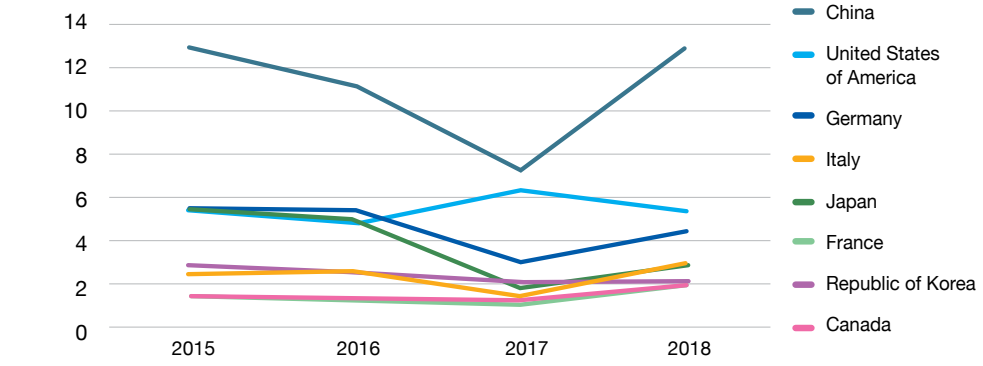


Figure 45. Parts of vessels and inputs supporting navigation and ports export trends by subsector, 2015–2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

Cargo handling equipment and related appliances is characterized by higher market concentration compared to the other subsectors, with China accounting for 23 per cent of global exports in 2018. Following China, in decreasing order, are the United States of America, Germany, Italy and Japan, the four countries together representing 29 per cent of the subsector's global exports. Figure 46 describes the trends across regions and economies.

(a) Cargo handling equipment/appliances



(b) Navigation aids, communications & IT

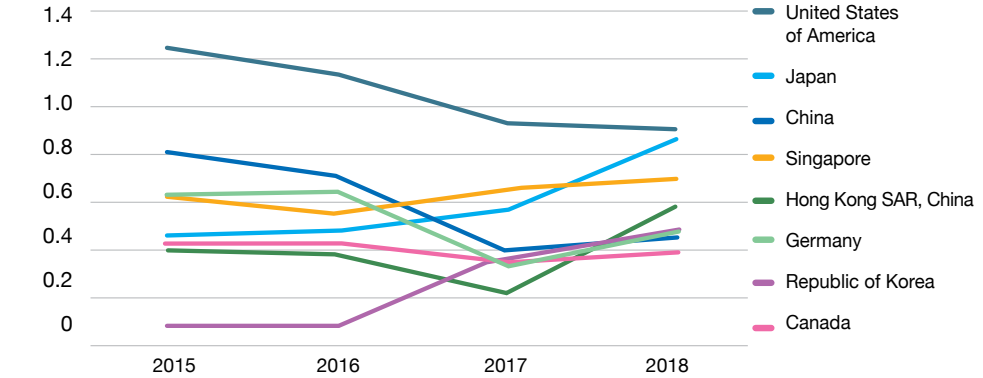
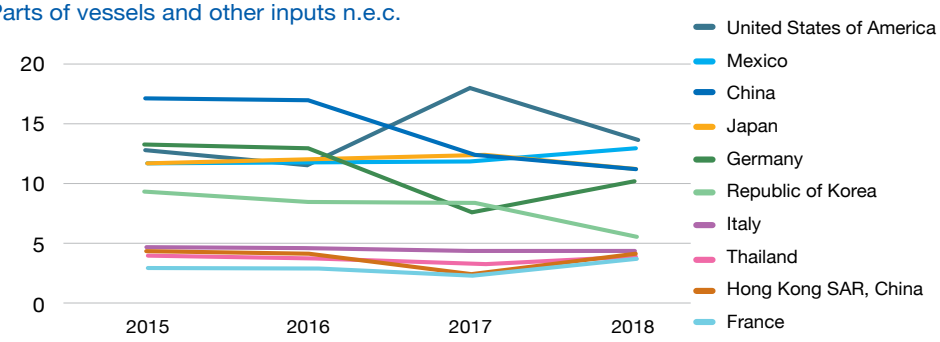


Figure 46: Leading exporters of parts of vessels and inputs supporting navigation and ports by region, 2015–2018 ($ billion)

(c) Parts of vessels and other inputs n.e.c.



Source: UNCTAD calculations based on UNCTADStat data (2020).

Market drivers and market access

Market drivers

The development of the sector is closely linked to many industries, including the shipbuilding industry, the sport and pleasure coastal tourism subsector, fisheries and processed fish sectors, ports upgrades for improved logistics and security using new technologies, as well as ships and ports maintenance. The growth of these industries depends on seaborne trade expansion, public regulation, and the replacement rates of vessels, parts and equipment. Regulation has been one of the most influencing factors, as most countries leading in the production and export of these subsectors have implemented stringent environmental requirements, while some have provided subsidies (notably in related industries such as shipbuilding and fisheries).

The trends of the past few years are primarily explained by the volumes of seaborne trade, vessel replacement, environmental regulations and countries' trade policies (UNCTAD, 2019b; OECD, 2017).

Industries that form part of this sector differ in business models. Some have decided to move production of intermediate inputs offshore (production remains in-house but in another country), while others prefer to outsource production to foreign suppliers. Ships are assembled from up to 550,000 parts for a complex research vessel, or 900,000 parts for cruise ships. Inputs required in the manufacturing process account for 70 to 80 per cent of the value of vessels (Gourdon and Steidl, 2019).

Countries can position themselves in these value chains to attract FDI and/or expand their export markets. The factors that usually contribute to these business decisions include search for cost reductions (e.g., lower wages, tax incentives), better access to upstream inputs (including raw materials) and access to differentiated and better-quality inputs or to specialized local human capital (Gourdon and Steidl, 2019).

Challenges

Limited information exists on each of the subsectors, notably for Navigation aids, communications and IT systems appliances and Sporting boats. The available information suggests that the challenges may be related to certain unfair competition practices and protectionism in the shipbuilding industry.[37] Studies suggest that the trade barriers in the shipbuilding sector are mainly

[37] The shipbuilding industry is highly concentrated and specialized. "The global shipbuilding industry is characterized by medium entry barriers which discourage firms from entering the market, but also increases the costs to exit it. Entry barriers include delivery times, reliability of yards, location of production and logistics. In specialty vessel markets (i.e., cruise ships or yachts) – part of the industry that is often characterized by a higher growth potential – entry barriers are higher as the construction of those vessels requires technological and organisational expertise, experience, and a highly skilled labour force" (OCED, 2017, p.28.). In 2018, China, Japan and the Republic of Korea maintained their traditional leadership in global shipbuilding, together representing 90 per cent of all shipbuilding activity. China alone accounted for 40 per cent of the activity, while Japan and the Republic of Korea boasted shares of 25 per cent each. To cope with declining orders, the shipbuilding sector has been undergoing reforms and has witnessed consolidation and increased government support (UNCTAD, 2019b).

due to subsidies, cabotage restrictions, and FDI restrictions (OECD 2017; ECORYS Research and Consulting, 2009). Large or wealthy countries, such as China, the United States of America, Western European countries, and Japan, have traditionally promoted their domestic marine industries, for instance through local content requirements (Balance Technology Consulting, 2016). These measures prevent the establishment of a level-playing field in terms of political support, financing, implementation of environmental regulations, etc. (Balance Technology Consulting, 2016).

Market access

Tariffs

Average MFN tariffs for Ships, port equipment and parts thereof are approximately 5 per cent, overall, and for both subsectors. Average tariffs in this sector can be as high as 38 per cent for the Bahamas and between 20 to 30 per cent in Bermuda, Djibouti, Maldives, and the Cayman Islands (Figure 47). A list of some products which most frequently face a tariff of over 20 per cent is provided in Table 10.

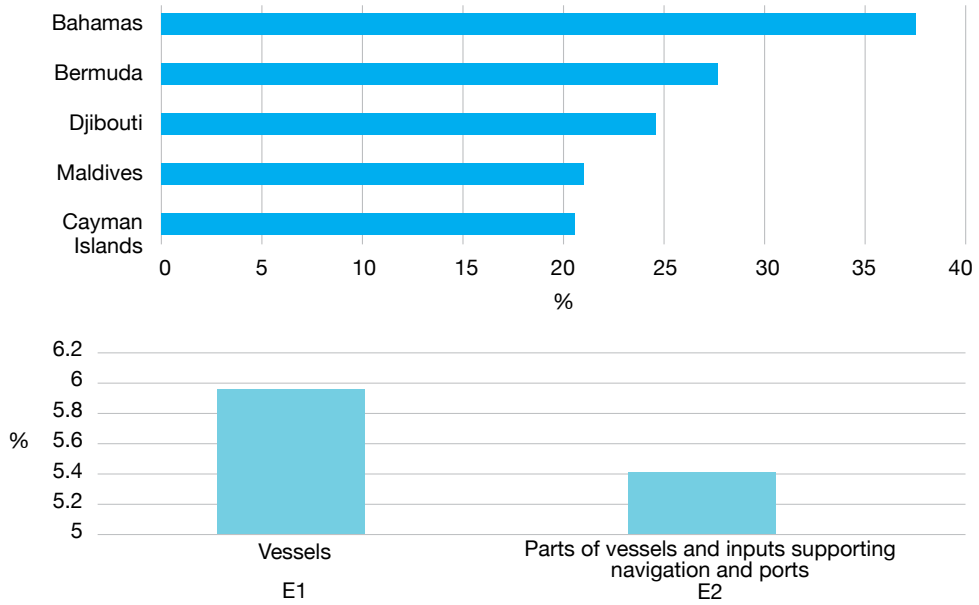


Figure 47. Highest tariffs in ships, port equipment and parts thereof by economy and average tariffs by subsector, 2018

Source: UNCTAD calculations based on WITS, TRAINS data (2020).

Table 10: HS6 products with tariffs above 20 per cent, 2018

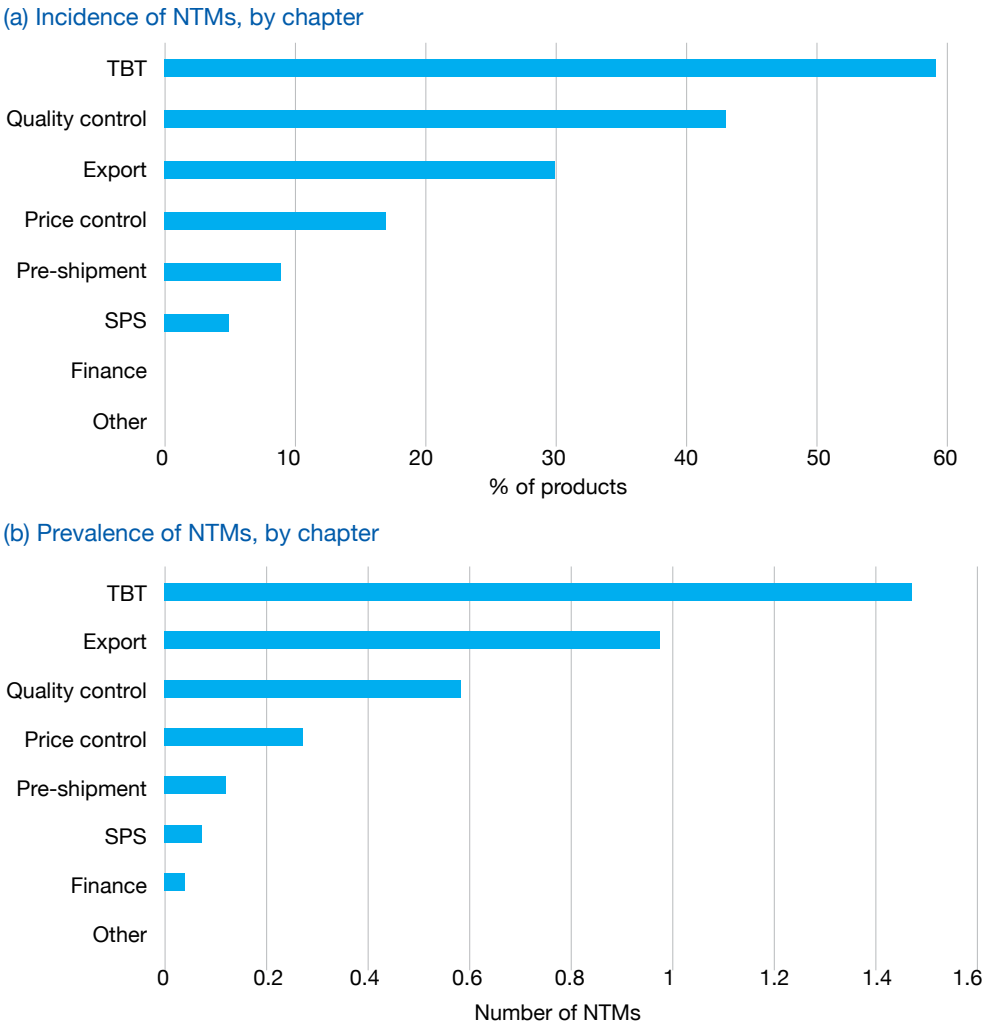
HS6	Product	OE subsector	Number of countries
842131	Intake air filters for internal combustion engines	E2 Parts of vessels and inputs supporting navigation and ports	30
890310	Inflatable vessels for pleasure or sports	E1 Vessels	27
890392	Motorboats and motor yachts, for pleasure or sports (other than outboard motor boats)	E1 Vessels	27
890391	Sailboats and yachts, with or without auxiliary motor, for pleasure or sports	E1 Vessels	27
890399	Other vessels for pleasure or sports	E1 Vessels	27

Source: UNCTAD calculations based on WITS, TRAINS data (2020).

Non-tariff measures

For Ships, port equipment and parts thereof, when averaged across countries, nearly 60 per cent of the products are subject to TBT measures and nearly 40 per cent are subject to some form of quality control measures. Export measures are also commonly applied with an incidence of 30 per cent. As could be expected, SPS measures are less common for this sector, with less than 5 per cent of the products being subject to them. TBT measures respond to quality and standards concerns underpinning such goods. The average number of TBT measures applied per product are, however, quite low: at 1.5 NTMs per product. No more than an average of one export measure is applied and the prevalence of other types of measures is negligible. The relatively low incidence and prevalence of NTMs for products in this chapter can be explained by the overall low health or environmental risk that these goods present.

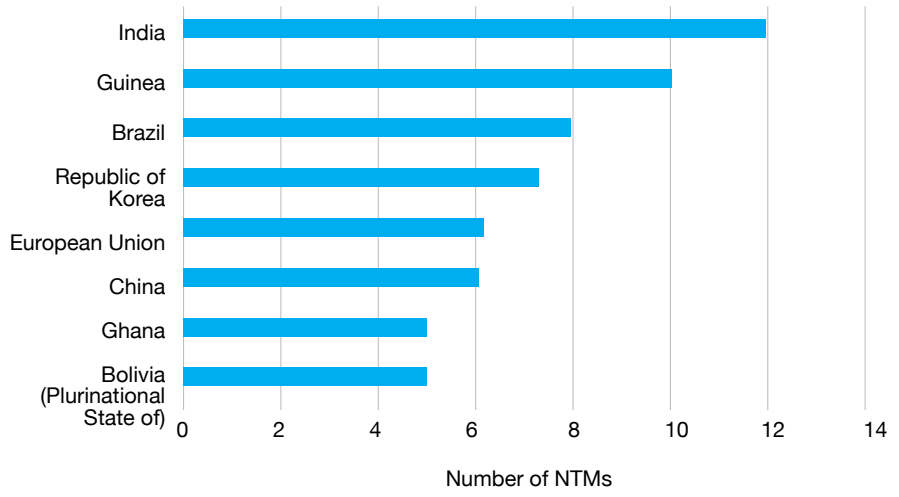
Figure 48: Incidence of NTMs on ships, port equipment and parts thereof by chapter



Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

Despite the overall low incidence and prevalence of NTMs for this sector, countries like India, Guinea and Brazil tend to apply a high average number of import NTMs per product. It is hard to justify these measures and determine whether they are legitimate; NTMs can be used as a disguised form of protectionism. The average number of import NTMs applied is almost the same for high, middle and low income countries.

(a) By country



(b) By income level

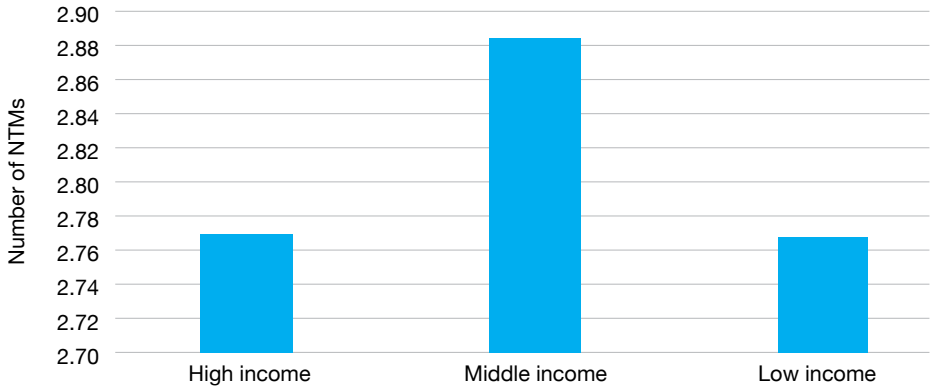


Figure 49: Prevalence of NTMs by country and income level: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

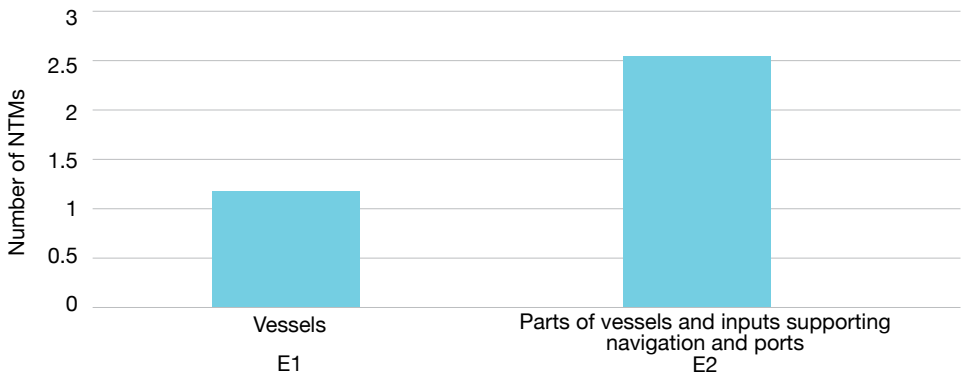


Figure 50. Prevalence of NTMs by subsector: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

Of the two subsectors, the prevalence of import NTMs is more than twice as high for Parts of vessels and inputs supporting navigation and ports, compared to Vessels. Product quality, safety and performance requirements are most common for products in this sector. Aside from other TBT requirements such as labelling or certification, import licensing requirements for reasons other than SPS or TBT are also commonly used by countries (Table 11).

Table 11: Most commonly used NTMs by subsector

E1 Vessels	E2 Parts of vessels and inputs supporting navigation and ports
B7 Product quality, safety or performance requirements	E1 Non-automatic import-licensing procedures other than authorizations covered under the chapters on SPS measures, and TBT
E1 Non-automatic import licensing procedures other than authorizations covered under the chapters on SPS measures, and TBT	B7 Product quality, safety or performance requirements
B31 Labelling requirements for TBT reasons	B31 Labelling requirements for TBT reasons
B83 Certification requirements for TBT reasons	B83 Certification requirements for TBT reasons
B82 Testing requirements for TBT reasons	B82 Testing requirements for TBT reasons

Source: UNCTAD TRAINS data (2020).

3.5 High-technology and other manufactures

The sector includes high-technology products (i.e., products with advanced technological development), and all manufactures not classified in the previous sectors which are required for the production/delivery of any ocean-based sector (UNCTAD, 2021). The SOEC gives particular attention to high-technology marine products as they represent some of the fastest growing industries,[38] and include industries that can significantly contribute to oceans sustainability. These include marine renewable energy, marine environmental monitoring and resource management, carbon sequestration technology, oil spill response equipment, fisheries and aquaculture, coastal tourism and safety, and security and surveillance.[39]

The sector also comprises biotechnology products, which are derived from the application of science and technology to living organisms. Examples include marine pharmacology, food complements, vitamins, personal care products, cosmetics, paints, adhesives, dyes, and gels (UNEP, 2019). Supply and equipment of marine pharmaceutical/chemical industries are also part of the sector (e.g., bioreactor to produce pharmaceuticals, technology for the use of seaweed in the production of food complements, etc.).

The subsectors' SOEC level 1 of disaggregation[40] is detailed as follows:

- Manufactures for the fishing and aquaculture industries, excludes vessels and parts thereof
- High technology manufacture for environmental sustainability and clean energy
- Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment
- Manufacture of coastal and marine sport goods, textile articles (except apparel) and other materials
- Other electrical equipment, machinery and appliances for other marine industries (such as food processing technologies, and equipment for other industries n.e.c. part of oceans economy).

High-technology and other manufactures is the largest ocean-based goods sector, its exports reaching $595 billion in 2018. The trends behind each subsector are very different and the subsection

[38] The UNEP (2018) study on environmentally sustainable technologies, although not specific to oceans, finds that these technologies increased by over 60 per cent between 2006 and 2016, and that the two sectors that have grown the most are renewable energy technologies (accounting for more than one third of the total trade value), followed by wastewater management and water treatment and solid and hazardous waste management technologies.

[39] Description based on OECD, 2019 and UNEP, 2018. It does not list products that are excluded from this classification.

[40] The detailed classification, including international codes for products at the most disaggregated level (i.e., HS) can be found in UNCTAD, 2021.

that follows provides industry profiles for High technology manufacture for environmental sustainability and clean energy and Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment. Due to the limited information on markets drivers, profiles were not produced for Manufactures for the fishing and aquaculture industries, excludes vessels and parts thereof; Manufacture of coastal and marine sport goods, textile articles (except apparel) and other materials; and Other electrical equipment, machineries and appliances for other marine industries.

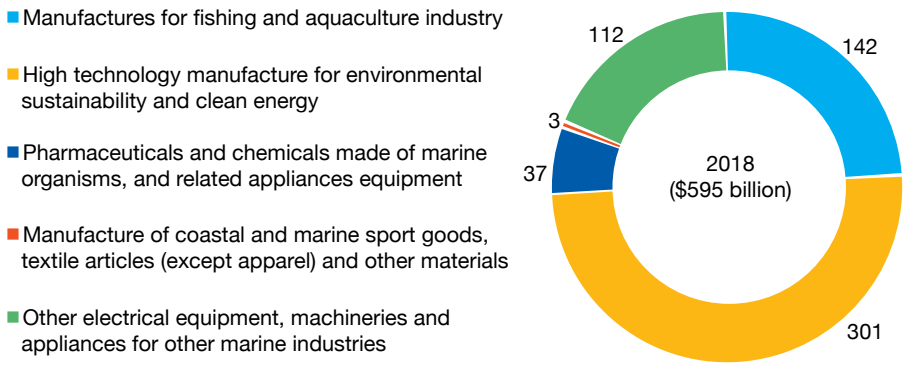


Figure 51: High-technology and other manufactures export composition by subsector, 2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

High technology manufacture for environmental sustainability and clean energy

Biotechnology and renewable energy technologies are contributing to the protection and management of the environment (PRNewswire, 2020, see Section 2.2.1). Among today's most pressing global issues is the waste accumulated in oceans, due in part to the discharging at sea of most untreated wastewater (WWAP, 2017). For example, coastal areas with limited water circulation, where agriculture utilizes excessive quantities of fertilizer, are overloaded by phosphorus and nitrogen which can cause eutrophication[41] and impede the regeneration of aquatic life. Eutrophication is also responsible for the development of algal blooms (e.g. sargassum) which affects both fresh and saltwater bodies and can also poison terrestrial animals through the release of toxins into drinking water (UNEP, 2019b). To support mitigation efforts, filters and other technologies are being developed (Sengupta et al., 2017; WWAP, 2017).

As for renewable energy technologies, these include all appliances, equipment and parts required for the functioning and development of sustainable ocean-based energy industries, namely: offshore wind energy, tidal power, wave power, submarine geothermal energy, chemical potential of seawater, marine biomass-based biofuels and related power plants/projects. Thus, the subsector includes:

- Technologies for wastewater management, water treatment and clean-up or remediation
- Cleaner and renewable energy technologies.

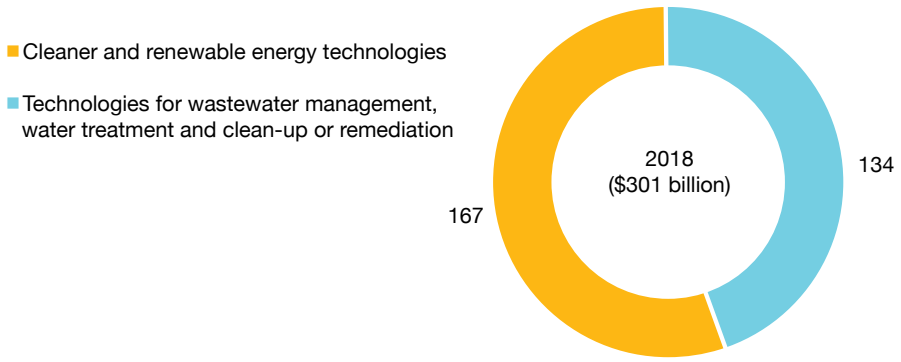
Trade trends

Total exports of the subsector in 2018 were valued at just above $301 billion. Exports of these technologies have somewhat declined since 2015 and saw a slight recovery in 2017. The subsector's CAGR for the period 2015 to 2018 was approximately –1 per cent. This trend responds to export declines from developing countries in Asia (–6 per cent) and developed Europe (–3 per cent) as these account for about 70 per cent of the sector's total exports (31 per cent and 41 per cent on

[41] Eutrophication is characterized by excessive plant and algal growth due to the increased availability of one or more limiting growth factors needed for photosynthesis, such as sunlight, carbon dioxide, and nutrient fertilizers (Chislock et al., 2013, p.1).

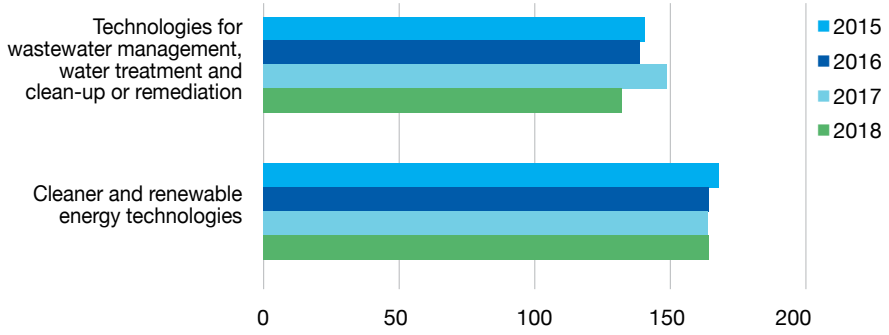
average for 2016 to 2018, respectively). At the country level, the best performer was the United States of America, which not only positioned itself as the leading exporter, but grew its market share over the past three years, reaching 14 per cent in 2018. Other economies that hold more than five per cent of global exports of Manufacture for environmental sustainability and clean energy are Germany, China, Hong Kong SAR, China and Japan (see Figure 54).

Figure 52. High technology manufacture for environmental sustainability and clean energy export composition by subsector, 2018 ($ billion)



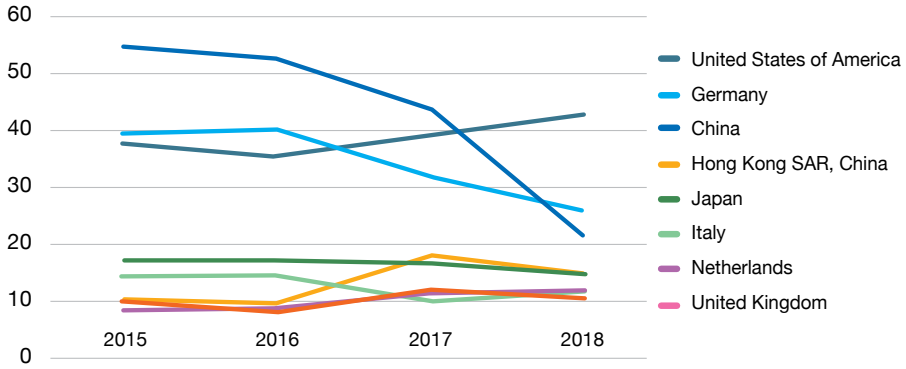
Source: UNCTAD calculation based on UNCTADStat data (2020).

Figure 53: High technology manufacture for environmental sustainability and clean energy export trends by subsector, 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Figure 54: Leading exporters of high technology manufacture for environmental sustainability and clean energy, 2015–2018 ($ billion)



Source: Authors' calculations based on UNCTADStat data (2020).

Market drivers

Extraction and processing practices of any ocean-based industry – those included in UNCTAD's SOEC as well as others (such as oil extraction) – can have a negative impact on the environment and on climate change. The 2015 Paris Agreement and the SDGs have led to game-changing regulations for industry. The development of new technologies is needed to address persistent

problems of pollution and deterioration of water quality in coastal areas. For example, in Asia, 65 per cent of all sewage is still dumped into the ocean without treatment (PEMSEA, 2015). As discussed in other sector profiles, regulations and capacity building on sustainable practices are essential for the lasting development of any ocean-based industry.

On the supply side, new information and communication technologies are a driving force for the development of ocean-based technologies as they improve the availability of data on the marine environment, such as currents, wave characteristics and water quality. By using satellite and remote sensing technologies and applying real-time connectivity and analytics to large datasets, a "smart oceans" platform is providing forecasts of sea conditions and improving marine safety (PEMSEA, 2015). The growth of the sector has enhanced innovation and increased investment, which are key contributing factors for its development. However, room for export growth remains.

There is no one-size-fits-all approach that can be used by all countries. To harness and maximize the opportunities of trade in High technology manufacture for environmental sustainability and clean energy, it is necessary to ensure coherence between environmental and trade policies within and across countries, and to effectively assess the impacts of the new technologies (UNEP, 2018).

Challenges

Among the key challenges facing the sector are the limited capabilities of countries to deploy and scale-up the use of environmental technologies. To date, the implementation of these technologies is limited when compared to their potential benefits, including addressing the pressing international issue of cleaning oceans from pollutants, such as plastics (Schmaltz et al., 2020). The main factor for their low uptake by businesses and governments is the lack of comprehensive and reliable information on the status of available technologies, their strengths and weaknesses (Schmaltz et al., 2020; UNEP, 2018), and levels of substitution or complementarity.

Other challenges include shortages of skilled labour for the development of new products, and of labour to provide services related to design, installation and maintenance. The subsector also has limited capacity to explore opportunities in global markets, and difficulty accessing finance for trade in environmental technology. From a regulatory perspective, the subsector lacks data for crafting fact-based policies and enabling coordinated international actions.

Most recently, IRENA (2020b) indicated that COVID-19 related measures have severely disrupted the manufacturing of equipment for renewable energy. Lockdown measures have resulted in the temporary closure of various manufacturing plants for renewable energy technologies around the world.

Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment

Marine life is estimated to constitute about 80 per cent of the world's animal and plant life, with thousands of bioactive compounds and secondary metabolites derived from marine organisms (Suleria et al., 2015). The unique compounds found in marine organisms (Balboa, 2015) are increasingly being utilized in pharmacology because they possess antibiotic, antiparasitic, antiviral, anti-inflammatory, antifibrotic, antibacterial, immunomodulator, anti-fungal, antimicrobial, neuroprotective, analgesic, anticancer activities, and antimalarial properties, among others. The subsector also includes nutraceuticals (i.e., food supplements and functional foods) primarily used for the development of products for human consumption, but also for animal feed. Marine organisms also contribute to other industries such as cosmetics, personal care products, paints, adhesives, dyes, gels and other chemicals (UNEP, 2019a; UNCTAD, 2018). The subsector also includes the supply of equipment used for the marine pharmaceutical and chemical industries, such as bioreactors to produce pharmaceuticals, and technologies for the use of seaweed in the production of food complements. UNCTAD's SOEC clusters these products into:

- Medicines (pharmaceuticals)
- Vitamins and food supplements (nutraceuticals)
- Cosmetics and chemicals
- Supply and equipment of the marine pharmaceutical/chemical industry.

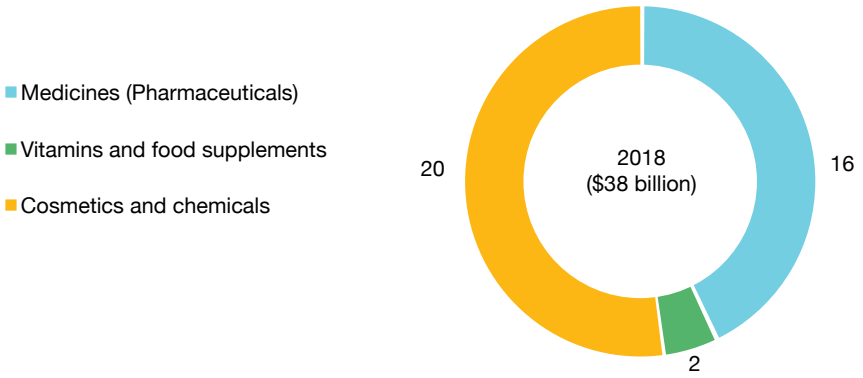
Due to a lack of data, the profiles below do not include information on the Supply and equipment of the marine pharmaceutical/chemical industry cluster.

Trade trends

Exports of the subsector (excluding equipment) were valued at $37.5 billion in 2018. The subsector grew steadily over the period 2015 to 2018; the CAGR for the period was 6 per cent. The trend is largely explained by exports of Cosmetics and chemicals which grew over the period and became the largest cluster within the subsector. The trends of the three subsectors are depicted in Figure 55.

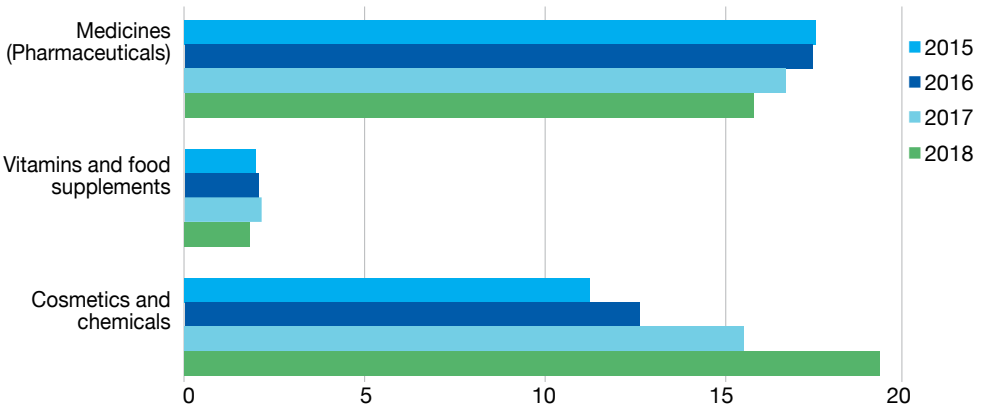
At the regional level, developed countries (in Europe, the Americas and Asia) are the groups that exhibited negative CAGR. The best performers are developing countries in Asia, which have substantially increased their market share in the pharmaceutical and cosmetic industries. The second-best performing group are developing countries in the Americas, which increased their market share in pharmaceutical and nutraceutical goods. The latter is the cluster in which all developing countries (with the exception of Asia) increased their market share the most. At the country level, China's 2018 exports stand out because its market share increased to 14 per cent. China is now the biggest exporter of pharmaceutical and chemical products. Other countries holding more than 5 per cent of the market include, in decreasing order, France, Switzerland and the Republic of Korea. Together, these countries account for 24 per cent of the market. The figures below depict the export trends of the Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment subsector.

Figure 55. Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment export composition by subsector, 2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Figure 56. Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment export trends by subsector, 2015–2018 ($ billion)



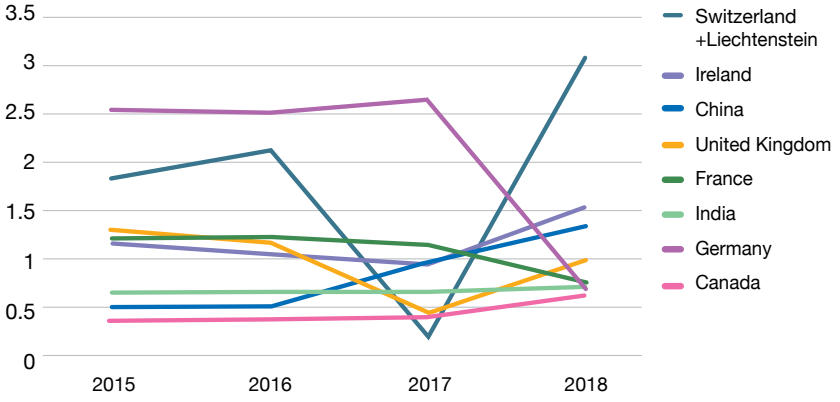
Source: UNCTAD calculations based on UNCTADStat data (2020).

Given the vast biological and genetic resources of developing and LDCs, and the business model used by the industries, the participation of these countries in the sector seems below their trade potential. In order to understand the different patterns and characteristics of each cluster, and the leading exporters and market drivers, the three clusters are discussed separately below.

Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment

As expected, estimated exports of Pharmaceutical goods made from marine organisms are largely dominated by developed countries in Europe. On average, for the period 2015 to 2018, the leading exporters of the subsector were Germany followed by Switzerland, although they follow opposite trends. Germany's exports declined for most of the studied period; its CAGR was –35 per cent and in 2018 it accounted for only 4 per cent of global exports. Exports of the Switzerland grew over the period (except in 2017); its CAGR was 19 per cent and its market share reached 19 per cent in 2018. Other economies holding more than 4 per cent of global exports are, in decreasing order: Ireland, China, United Kingdom, France and India. The above seven countries account for 56 per cent of the global exports of pharmaceuticals. Among developing countries, the leading economies, beside the two mentioned earlier, are Brazil and Hong Kong SAR, China; the market share of each of these is about 1 per cent. The top 10 developing and least developed economies are presented in Figure 57.

(a) Overall



(b) Developing countries

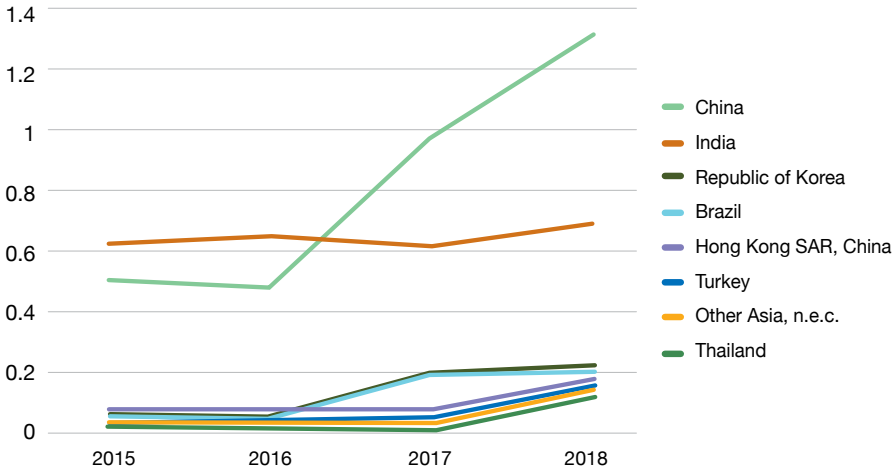


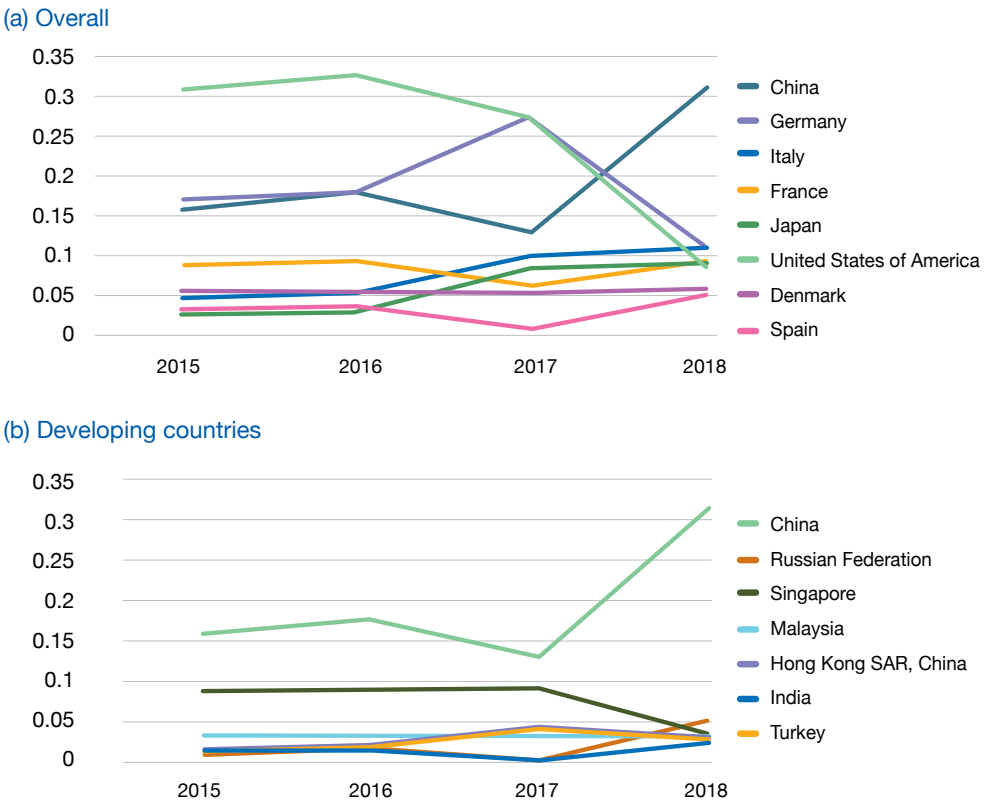
Figure 57. Leading exporters of pharmaceutical goods made from marine organisms by country, 2015–2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

Nutraceuticals

For nutraceuticals made from marine organisms, on average for the period 2015 to 2018, China and the United States of America held the largest market share (10 and 11 per cent, respectively). The export paths of the two countries over the period were different, however. Exports from the United States of America declined since 2016, reaching a market share of 4 per cent in 2018; its CAGR for 2015 to 2018 was –35 per cent. In contrast, exports from China followed a fluctuating, yet upward, trend over the period and in 2018 accounted for 17 per cent of the world's exports. Other leading exporters holding at least 4 per cent of the market are Germany, Italy, France and Japan. The top six exporters accounted for 43 per cent of global exports. Among developing economies, the leading exporters in 2018 (accounting for 1 to 3 per cent of global market share) were the Russian Federation; Singapore; Malaysia; Hong Kong SAR, China; India; and Turkey (all Asian developing economies) (see Figure 58).

Figure 58. Leading exporters of nutraceutical products by country, 2015–2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Cosmetics and chemicals

The leading exporters of marine-based cosmetics and chemicals during the period 2015 to 2018 were France (15 per cent), the United States of America (9 per cent) and China (8 per cent). In 2018, China became the biggest exporter of cosmetics and chemicals. There was an eightfold increase in exports from China between 2017 and 2018, with the country's exports accounting for 17 per cent of global exports, followed by France (15 per cent of market share). The three economies, together with the Republic of Korea, Hong Kong SAR, China, and Canada account for 59 per cent of global exports of cosmetics and chemicals. In the case of exports from developing countries, although exports increased in most countries, only the countries listed above and the United Arab Emirates, Thailand and Singapore, exhibited export market shares above one per cent. The trends are presented in Figure 59.

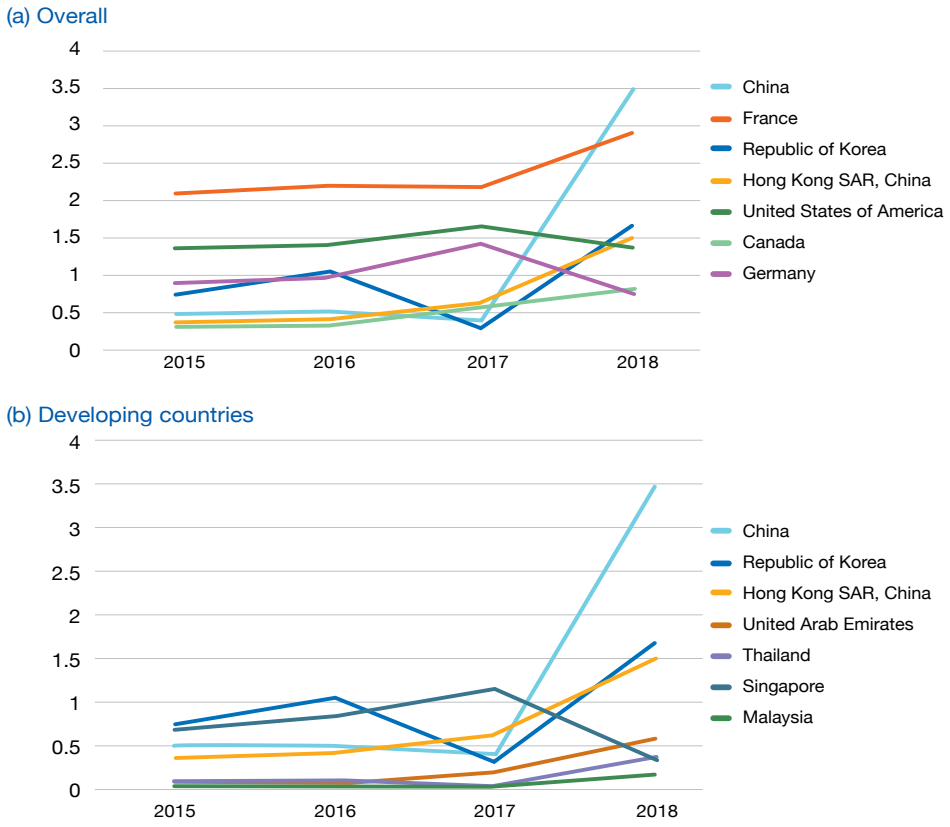


Figure 59. Leading exporters of cosmetics and chemicals by economy, 2015–2018 ($ billion)

Source: UNCTAD calculations based on UNCTADStat data (2020).

Market drivers

Market reports on the subsectors discussed above suggest that the upward trend has continued in 2019 in all three segments. In marine pharmaceuticals, the subsector is expanding due to bioprospecting,[42] most notably of antibiotics, followed by bioactive and bioassays in clinical diagnostics which are expected to witness the highest growth (PRNewswire, 2020). As for Nutraceuticals and Cosmetics, Grand View Research (2020) predict that the two subsectors will grow the fastest and double in size by 2027.

Demand factors contributing to the development of the sector include changing consumer lifestyles, growing health concerns, and the increased prevalence of chronic disorders (Grand View Research, 2020). In the case of Medicines (pharmaceuticals), the high cost of these drugs may hamper the subsector's growth, but can be mitigated by increasing supply, regulating anticompetitive practices and abusive pricing, and promoting over-the-counter pharma products.

On the supply side, new technologies have allowed for the exploration of the oceans and the development of new products. These have made it possible to discover new bioactive compounds with important properties and have enabled their applicability for the development of pharmaceuticals and other products with high economic value (Suleria et al., 2015).[43] The more widespread cultivation of marine organisms is also contributing to the sector's expansion. For example, krill in the South China Sea and the Indian Ocean is forecast to contribute to the expansion of nutraceuticals. International legal frameworks such as the Convention on Biological Diversity (1993) and the Nagoya Protocol on Access and Benefit Sharing (complementing the former and

[42] For information on marine pharmaceuticals that has been approved and that are in Phase II of approval see Midwestern University dedicated website at <https://www.midwestern.edu/departments/marinepharmacology/clinical-pipeline.xml>.

[43] For more on this, see for example, the European Commission website – https://ec.europa.eu/maritimeaffairs/policy/biotechnology_en?2nd-language=pt.

entered into force in 2014), and voluntary systems, have also been key to the development of the sector.[44] These have contributed to increased legal certainty in research and development activities which, in turn, are creating new opportunities in the marine pharmaceutical and chemicals market. The growth of the industry is far from over. In 2017, marine ingredients represented only about 1 per cent of the active ingredients in cosmetics and personal care products, an industry that is valued at $23.9 billion and is expected to continue growing (Kline Group, 2018).

Factors contributing to the subsector's expansion are the diversification of the product portfolios of companies, strategies such as mergers and acquisitions, and licensing agreements. The period 2014 to 2018 witnessed increased licensing agreements among market players, which helped improve technology for the development of various pharmaceutical products (PRNewswire, 2020).

The export growth of developing countries is in part explained by increased investment by the world's pharmaceutical giants in developing regions. For example, Novartis and Pfizer are expected to drive market growth in Asia (Acumen Research and Consulting, 2020). The subsector provides strong investment opportunities for coastal countries, not least in terms of FDI. In fact, the business model of large pharmaceutical companies in developed economies is characterized by having a portfolio of investment located in different parts of the world. These companies usually outsource large parts of research and development and manufacturing, as well as distribution, and sales and marketing (PwC, 2020). Furthermore, to de-risk their supply chain, some large companies have initiated a dual-sourcing mechanism over the past years. As a result of COVID-19, some companies are now considering a multiple-sourcing strategy (McKinsey & Company, 2020b). Investment has been in countries with strict regulations on quality (e.g., specific packaging requirements), sound intellectual property protection, and low labour and manufacturing costs.

Challenges

The environmental impact of extraction is one of the most important challenges. For example, some pharmaceutical companies focus on extracting compounds with cytostatic and cytotoxic activity, which often play a defensive ecological role by deterring predators, suppressing competing neighbours, inhibiting bacterial or fungal infections, or protecting against ultraviolet radiation (UNCTAD, 2018).

Another challenge is the unfair allocation of property rights arising from the use, development and commercialization of marine genetic resources acquired through traditional knowledge. It is a common practice for pharmaceutical firms, and those from other subsectors, to build their research and development on the knowledge and practices of indigenous communities. The unauthorized use of marine genetic resources and associated traditional knowledge has in some cases given rise to claims of illegal access and "bio-piracy" (UNCTAD, 2018).

Related to the above is a widespread lack of knowledge about the socio-economic potential of the subsectors and methods to implement sustainable environmental practices. At present, sustainable practices have been observed among companies that aim to ensure access to source areas and strive for high quality products and favourable public perception (UNCTAD, 2018). In most countries, gaps remain on appropriate regulation and data to facilitate monitoring. Filling such gaps is of paramount importance for the sustainability of oceans and to maximize the potential benefits of the subsectors. This is critical for attracting FDI which, in turn, can promote trade diversification and expansion.

Market access

Tariffs

Average tariffs on High technology and other manufactures n.e.c are 6 per cent. However, tariffs can reach as high as 30 per cent in the Bahamas, and between 15 to 20 per cent in Bermuda, Djibouti, Iran, Maldives, and the Cayman Islands (Figure 60).

[44] For information on regulations and voluntary system implementation see Vivas Eugui and Ruiz Muller (2018).

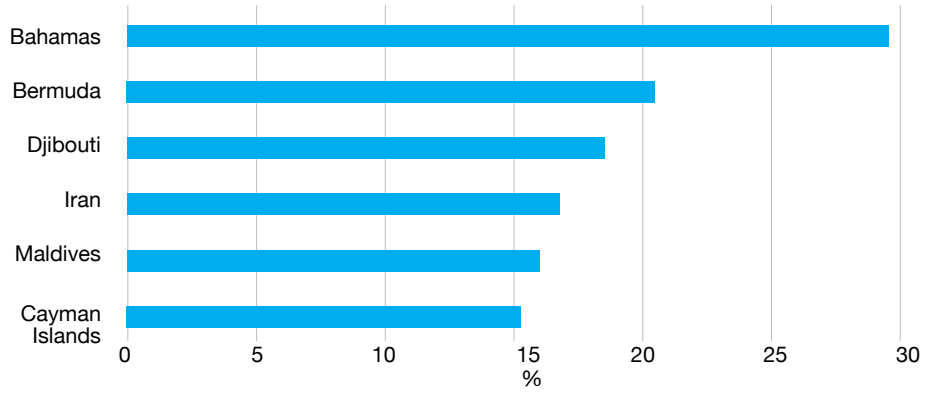


Figure 60. Highest tariffs in high technology and other manufactures n.e.c., 2018

Source: UNCTAD calculations based on WITS, TRAINS data (2020).

Among the various subsectors, F1 Manufactures for the fishing and aquaculture industries, excludes vessels and parts thereof and F4 Manufacture of coastal and marine sport goods, textile articles (except apparel) and other materials, are among the highest, at nearly 7 per cent. On average, MFN tariffs are relatively low for F3 Pharmaceuticals and chemicals made of marine organisms, and related appliances. Yet a small number of products within this subsector face a tariff of over 20 per cent in several countries (Table 12).

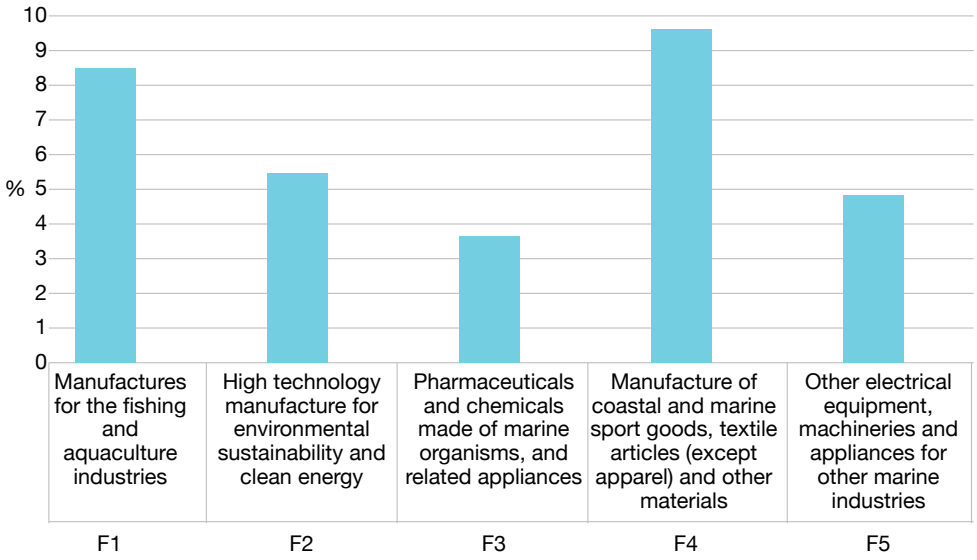


Figure 61. Average tariffs by subsector, 2018

Source: UNCTAD calculations based on WITS, TRAINS data (2020).

Table 12. HS6 products with tariffs above 20 per cent, 2018

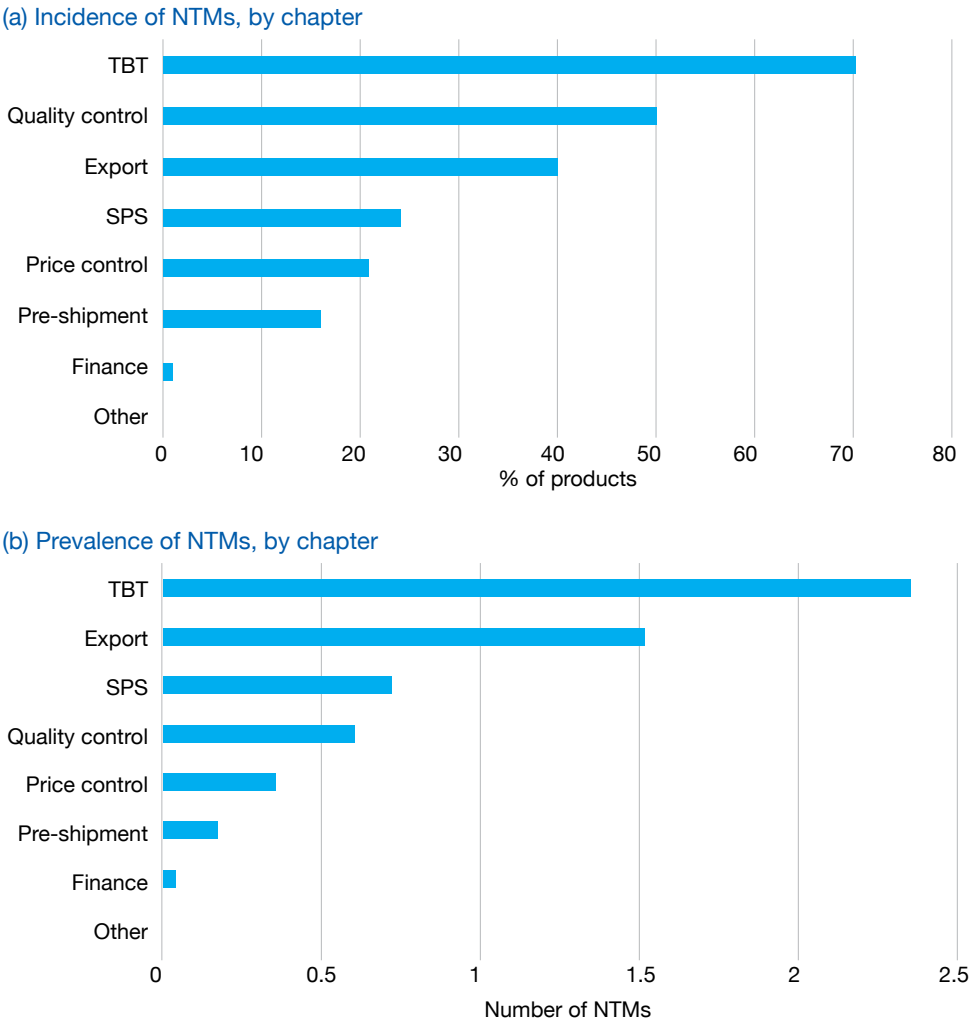
HS6	Product	OE subsector	Number of countries
854389	Electrical machines and apparatus, having individual functions, not specified or included elsewhere in this chapter; other	F2 High technology manufacture for environmental sustainability and clean energy	195
293132	Dimethyl propylphosphonate	F3 Pharmaceuticals and chemicals made of marine organisms, and related appliances	73
293134	Sodium 3-(trihydroxysilyl)propyl methylphosphonate	F3 Pharmaceuticals and chemicals made of marine organisms, and related appliances	73
293139	Separate chemically defined organo-phosphorous derivatives, n.e.s.	F3 Pharmaceuticals and chemicals made of marine organisms, and related appliances	73
293136	(5-Ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl) methyl methyl methylphosphonate	F3 Pharmaceuticals and chemicals made of marine organisms, and related appliances	73

Source: UNCTAD analysis based on WITS, TRAINS data (2020).

Non-tariff measures

This sector predominantly consists of manufactured goods. As such, the incidence and prevalence of TBT measures is the highest. This helps respond to the product quality and safety concerns that may apply to these products. An average of nearly 2.5 TBT measures apply to 70 per cent of the products. The incidence and prevalence of SPS measures is low. Quantity control measures tend to apply to near 50 per cent of the products. The incidence of export measures is 40 per cent, while their prevalence is 1.5 (Figure 62).

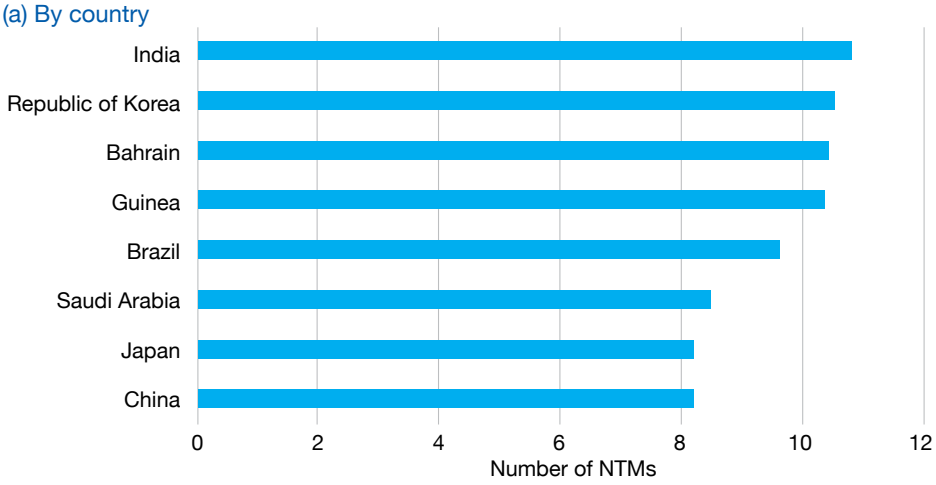
Figure 62: Incidence and prevalence of NTMs on marine fisheries by chapter



Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

High income countries tend to regulate imports the most with an average of five NTMs applied per product. The list of countries that apply the highest number of import NTMs is quite similar to that of other sectors. The prevalence of import NTMs is highest in India, the Republic of Korea, Bahrain, Guinea and Brazil, all of which apply nearly 10 NTMs per product, significantly higher than the overall average of 4.93 per product.

(a) By country



(b) By income level

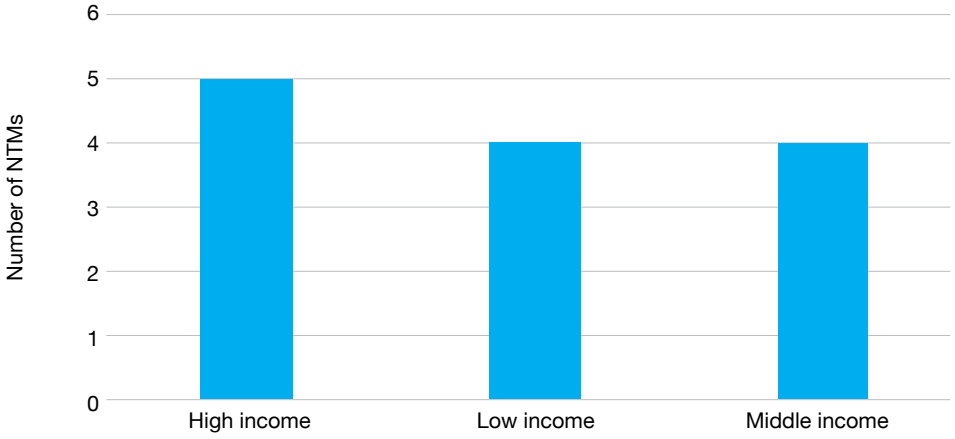


Figure 63. Prevalence of NTMs by country and income level: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

F1 Manufactures for the fishing and aquaculture industries, excludes vessels and parts thereof and F2 High technology manufacture for environmental sustainability and clean energy are the most regulated subsectors, with an average of nearly 2.5 import NTMs applied per product. The prevalence of NTMs is the lowest for F3 Pharmaceuticals and chemicals made of marine organisms and related appliances and equipment. Labelling requirements for TBT reasons is the most commonly used NTM type across all subsectors. Licensing requirements for reasons other than SPS and TBT are also very commonly used, and so are product quality and safety requirements. A list of the most commonly applied NTMs by subsector is provided in Table 13.

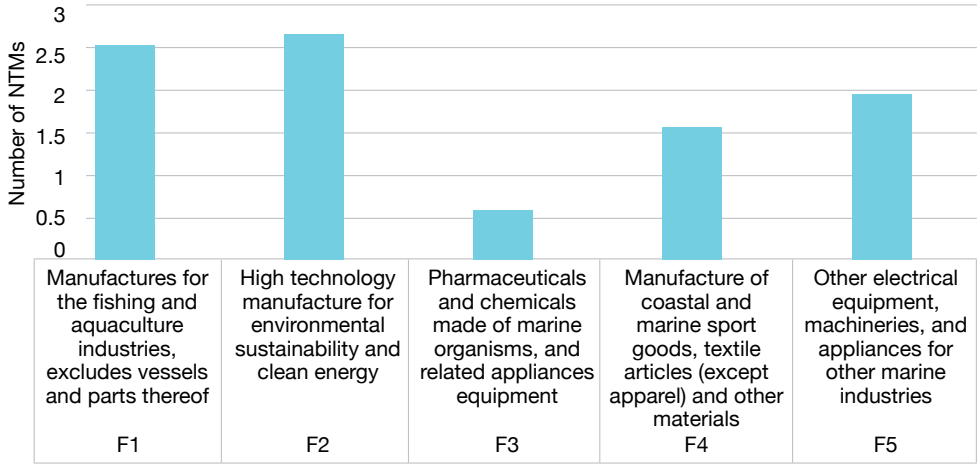


Figure 64. Prevalence of NTMs by subsector: import measures

Source: UNCTAD calculations based on UNCTAD TRAINS data (2020).

Table 13. Most commonly used NTMs by subsector

F1 Manufactures for the fishing and aquaculture industries, excludes vessels and parts thereof	F2 High technology manufacture for environmental sustainability and clean energy	F3 Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment	F4 Manufactures of coastal and marine sports goods, textile articles (except apparel) and other materials	F5 Other electrical equipment, machineries and appliances for other marine industries
B31 Labelling requirements for TBT reasons	B31 Labelling requirements for TBT reasons	B31 Labelling requirements for TBT reasons	B31 Labelling requirements for TBT reasons	E1 Non-automatic import licensing procedures other than authorizations covered under the chapters on SPS measures and TBT
E1 Non-automatic import licensing procedures other than authorizations covered under the chapters on SPS measures and TBT	E1 Non-automatic import licensing procedures other than authorizations covered under the chapters on SPS measures and TBT	E1 Non-automatic import licensing procedures other than authorizations covered under the chapters on SPS measures and TBT	B7 Product quality, safety or performance requirements	B31 Labelling requirements for TBT reasons
B83 Certification requirements for TBT reasons	B7 Product quality, safety or performance requirements	B81 Product registration/ approval requirements for TBT reasons	B83 Certification requirements for TBT reasons	B7 Product quality, safety or performance requirements
B7 Product quality, safety or performance requirements	B83 Certification requirements for TBT reasons	B82 Testing requirements for TBT reasons	B82 Testing requirements for TBT reasons	B82 Testing requirements for TBT reasons
P33 Licensing, permit or registration requirements to export	B82 Testing requirements for TBT reasons	A31 Labelling requirements for SPS reasons	E1 Non-automatic import licensing procedures other than authorizations covered under the chapters on SPS measures, and TBT	P33 Licensing, permit or registration requirements to export

Source: UNCTAD TRAINS data (2020).

3.6 Selected ocean-based services sectors – a snapshot

The two sectors for which data on trade in services exist, as well as subsectors for which at least some trade in services data and information on market drivers are available, are described here.

Marine and coastal tourism

The sector comprises all establishments for which the principal activity requires facilities and services for ocean-related tourism and leisure activities, such as restaurants, hotels and seaside accommodation located in a place near or adjoining the coast, marine sports, recreational fishing, marinas, aquariums, agencies providing services such as excursions to underwater cultural habitats, etc. The sector does not include cruise shipping, which is part of Maritime transport and related services because of the regulations that underpin it and the type of inputs and services required.

UNCTAD's SOEC categorizes the services that form part of Marine and coastal tourism into four groups and further disaggregates them into seven subsectors.[45] The four groups are:

- Hotels and restaurants (including catering)
- Travel agencies and tour operators' services
- Tourist guides services
- Recreational and other services.

[45] UNCTAD (2021) provides further details on each subsector.

Because of data constraints, the data presented here only include consumption abroad, which occurs when consumers consume services while outside their country (i.e., mode 2). Given that current international classifications and data collection do not differentiate between marine and coastal tourism and other types of tourism, the available trade trends are an estimate. The trends presented here should therefore be interpreted with caution. The methodology is presented in Annex 1.

Trade trends

Trade data estimates reveal that in 2018 the export value of the maritime tourism sector (measured by visitors' expenditure) was about $1.12 trillion. This is the largest sector of the ocean-based industries. On average, at both global and regional levels, the sector enjoyed steady growth over the period 2015 to 2018, with a global CAGR of 5 per cent. This upward trajectory was halted following the global breakout of the COVID-19 pandemic in 2020.

Developing countries from Asia and developed countries from Europe (which include all 28 European Union member states during the period of analysis) account for 34 per cent and 31 per cent, respectively, of foreigners' expenditure in tourism. Both regions benefited from positive year-over-year growth during the period. The best performing regions, however, were developed countries in Asia, transition economies, developing countries in Africa, and LDCs from small island developing states. These regions grew at double-digit levels for more than one year, and increased their market share between 2015 and 2018 (the regions' market share continued to grow in 2019). By contrast, the regions that showed the lowest annual percentage change (about one per cent, nil or a negative rate) were LDCs from Africa and developed countries from the Americas.[46]

The United States of America holds the highest average market share for 2015 to 2018 (16 per cent), followed by Spain (7 per cent) and China (6 per cent). The market share distribution is rather even among the remaining top 20 countries (between 2 and 3 per cent). The annual percentage change of leading markets has varied, however. The period has also witnessed countries with double-digit growth for more than a year, and even some with double-digit CAGR for the period 2015 to 2018. Within that group are six developed economies (from Europe and Asia) and 19 developing economies (mainly from Asia, but also from transition economies and Africa). Figure 65 provides further detail on those export trends.

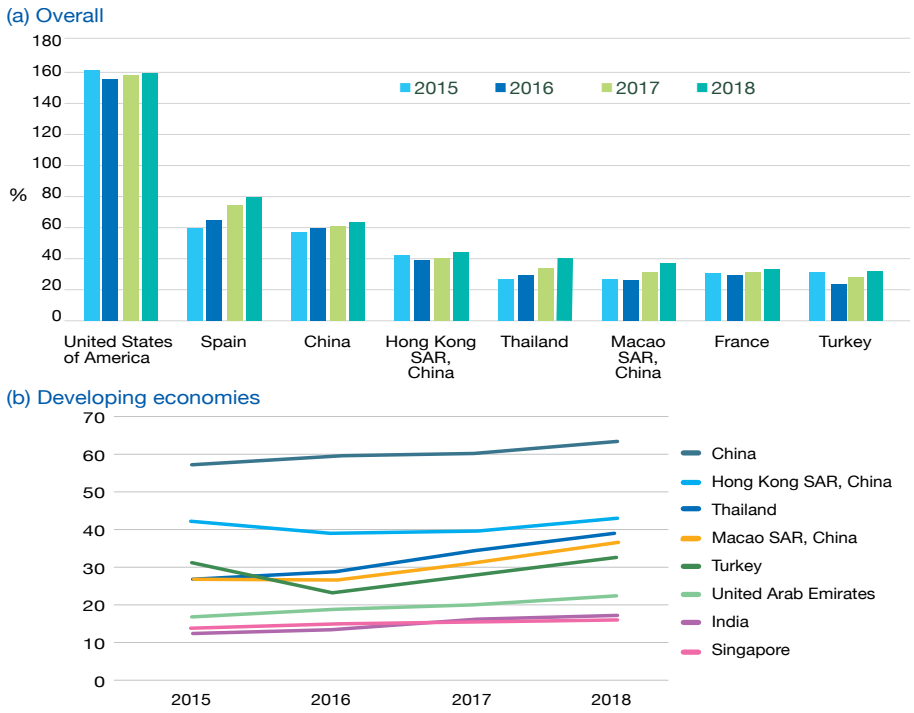


Figure 65. Leading exporters of marine and coastal tourism, 2015–2018 ($ billion)

Source: UNCTAD's calculations based on WTTC data (2020).

[46] Countries and economies were classified by level of development according to UNCTAD's classification.

Finally, it is worth noting that in 2019, fewer countries achieved a double-digit annual growth rate (33 countries versus 67 in 2018). A greater number of countries also had a negative growth rate for 2019: 34 countries, of which seven hold more than three per cent market share, and 23 countries with less than one per cent market share. In 2018, a total of 24 countries had negative rates, and among these only one held three per cent market share. Most economies featuring negative rates were in developed Europe and developing countries in the Americas. In 2020, the tourism sector in virtually all regions of the world was severely impacted by the COVID-19 pandemic. Although there are limited data available for coastal tourism, international arrivals fell by 87 per cent between January 2020 and January 2021 (UNWTO, 2021).

Market drivers

On the demand side, increases in purchasing power, particularly in developing countries, and greater access to online services (an important substitute since the COVID-19 pandemic), have fuelled export growth. After more than nine months of restrictions and confinement, vaccines against COVID-19 and new offers provided by the tourism sector (such as health and safety measures), are expected to increase demand. As in the past, however, some of the most decisive factors for the sector's growth rely on the supply side (i.e., security, political stability, natural endowments, connectivity and availability of quality services). Technology improvements such as predictive analytics and machine learning (Shi, 2018), as well as online marketing, have enabled firms to reduce their costs and reach more customers. The industry has also increased the type of services provided, and identified new niche markets (e.g., eco-tourism, nature tourism, sport tourism, etc.). Low-cost airlines have also been an important contributing factor because of their affordable prices, the ease of purchasing airline tickets online, and the availability of attractive routes. National policies to support the sector's development are also crucial, such as facilitating access to tourist visas, and implementing environmental regulations to promote the sector's sustainability.

Challenges

It is common cause that across all regions tourism has been one of the sectors most affected by the COVID-19 pandemic. In addition to travel restrictions, the sector is also impacted by the slowdown of the global economy, industry disruptions, and social and geopolitical tensions. All these factors are expected to continue undermining the tourism sector, although their extent remains uncertain. Due to COVID-19, the sector was shut down or worked under strict limitations for most of 2020–2021 across the world. In the medium- to long-term, the tourism industry will have to envision a business model where sanitary and safety measures are an integral part of the service provided. Overcoming the challenges posed by COVID-19 will depend on countries' ability to adapt regulations (public sector) and managerial processes (private sector), coordinate actions between the public and private sectors, and between countries. There will be also a need for the sector to mitigate socio-economic impacts on livelihoods, to move towards green and blue investment, enhance coordination and partnerships to ensure tourism's restart and recovery puts people first, provide digital skills – particularly for workers temporarily without jobs and for job seekers – and work together to ease and lift travel restrictions in a responsible and coordinated manner (United Nations, 2020b).

The sector also faces environmental challenges. Despite being economically profitable, an unmanaged tourism sector generates considerable environmental damage, and is overly dependent on natural endowments. To supply visitors with a variety of goods and services, pressure on natural resources can quickly become unsustainable. For instance, the additional demand for water, energy or food – extremely scarce resources in many coastal areas – causes pressure on local territories and communities, leading to overfishing, water shortages, as well as expensive electricity and cooling/heating costs. In addition, coastal and maritime tourism causes marine and freshwater pollution through the discharge of sewage and the disposal of substantial quantities of solid waste. Coastal and maritime tourism also generate activities on land, such as infrastructure construction, that are responsible for considerable amounts of pollution and destruction of natural habitats, as well as pressure on natural resources such as water, sand, limestone and wood.

Several international environmental agreements and declarations set the framework and provide guidelines for sustainable tourism activities, including Agenda 21 (1992), the Convention on Biological Diversity (2000), UNWTO's Global Code of Ethics for Tourism (1999), The Rio +20 Declaration (2012), and the 2030 Agenda and its SDGs (2015).

Maritime transport and related services

Maritime transport and related services belongs to both traditional and emerging services as the industry is poised to introduce innovations that enhance performance and sustainability. The sector has also grown in importance. In recent years, over 80 per cent of the world's trade has been carried by sea (UNCTAD, 2019b) as it is the most cost-effective way to move goods and raw materials around the world (UNCTAD 2020a).

The sector includes transport of passengers and freight, as well as so called "auxiliary services." These services include a wide array of industries such as shipbuilding, repair and maintenance of ships, boats and offshore supply vessels, but also advanced sensing, communications, big data analytics applications for port facilities and maritime supply chains, technical services, inspection and survey, ship brokers and other freight transport agency services, wholesale and retail, labour supply services and others related to this activity.[47] Marine insurance and finance are also key industries in the Maritime transport and related services sector.

UNCTAD SOEC considers recent references such as UNCTAD's Review on Maritime Transport (UNCTAD 2019c, 2020a), as well as documents used for the purpose of trade negotiations such as the WTO's Draft Schedule on Maritime Transport Services presented during the Uruguay Round negotiations in 1996, the "maritime model schedule" under the more general WTO General Agreement on Trade in Services Negotiations (GATS) negotiations since 2000, and WTO W/120 services classifications (WTO, 2010). It also benefited from advice provided by experts on maritime transport and ports from UNCTAD, the WTO and the World Port Sustainability Program.

The UNCTAD's SOEC clusters the Maritime transport and related services sector into four subsectors, each of which is further disaggregated to enhance understanding of the subsector and facilitate value chain analysis and policy design. The sector excludes services specific to trade in fisheries that are not transport related. The four subsectors include:

- Passenger transportation
- Freight transportation
- Auxiliary services to maritime transport
- Marine insurance and finance (data for this subsector were not available).

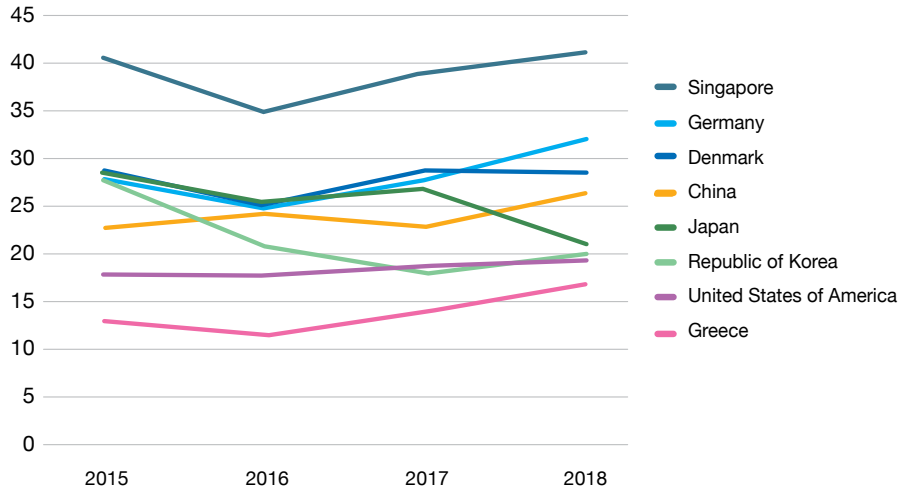
Because of data constraints, the trends discussed here for Maritime transport and related services are based on the three first sectors listed above. Global trade data are only available for the first three subsectors and only at an aggregated value, i.e., not by subsector. Data by subsector are available for a handful of countries that do not include major economies such as the United States of America.

Trade trends

Exports of Maritime transport and related services in 2018 reached $399 billion. The sector saw its exports drop by 9 per cent in 2016, but since then it has witnessed positive growth. Exports, however, have not reached the highest value observed over the past decade. In 2011, exports were above $400 billion. Over the past five years, Singapore accounted for about 12 per cent of exports, followed by Germany (8 per cent), Denmark (8 per cent) and China (7 per cent) (see Figure 66). The best performer over the period was India, which exhibited positive growth over the entire period and double-digit growth for more than one year – its market share grew from 3 to 4 per cent. Other strongly performing markets are Iraq, Bangladesh and Slovenia, even though their market share remained below 1 per cent.

[47] Description based on UNCTAD (2019b), OECD (2016), UNSD (2015) and WTO (2010b).

Figure 66. Leading exporters of maritime transport and related services by country, 2018 ($ billion)



Source: UNCTAD calculations based on UNCTADStat data (2020).

Table 14. Countries exhibiting most rapid growth in exports of maritime transport and related services, 2015–2018 ($ billion)

Country	Exports ($ billion)	Annual percentage in growth rate		
	2018	2016	2017	2018
Greece	16.75	-11%	20%	20%
Norway	16.72	-3%	11%	10%
France	15.64	-17%	18%	10%
India	12.67	3%	15%	10%
Estonia	1.01	-7%	13%	11%
Iraq	0.71	53%	22%	61%
Slovenia	0.46	10%	11%	13%
Bangladesh	0.38	8%	22%	60%
Belarus	0.32	-6%	35%	12%

Source: UNCTAD calculations based on UNCTADStat data (2020).

Market drivers

As can be expected, the development of the sector is highly linked to growth in the global economy and international trade. In the past decade, however, the many industries that form part of the sector have also been shaped by structural changes:

- supply chain restructuring in favour of more regionalized trade flows
- larger role played by technology and services in value chains and logistics
- regulatory changes to promote environmental sustainability, amid climate change, more frequent natural disasters, and poor shipping practices that can lead to the degradation of coastal and marine areas (PEMSEA, 2015).

Sustainable shipping, decarbonization and ship pollution control are expected to remain priorities for the sector. Many actions are taking place in that regard. In terms of efficiency gains, the sector is striving to enhance ship energy efficiency, use alternative fuels, and develop national action plans to address environmental degradation and GHG emissions from international shipping. Such plans include the use of clean energy, stricter safety measures, integrating the International Maritime Organization (IMO) 2020 sulphur limit, ballast-water management, the reduction of pollution from plastics and microplastics, and the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. Regulations also aim to address ships' GHG emissions, including by recycling less energy efficient or highly polluting vessels, and by promoting eco-designs for ships and increases in vessel sizes.

In recent years, the industries that have fared best were cruise shipping and liner shipping carriers, which closely monitored and adjusted ship supply capacity to match demand and reduce costs. Cruise shipping has harnessed technology and adopted new practices to comply with environmental regulations and expand market size. It is partnering with local governments and adapting its offer to new types of demand (CLIA, 2020). The prospects for the industry remain positive. In the context of COVID-19, the industry is developing and implementing health and safety protocols and adapting to increased regulatory complexity enforced by destinations and business partners.[48] As for liner shipping, producers have implemented capacity management strategies such as suspending services, blanking scheduled sailings and re-routing vessels. The new landscape is also being defined by new business models. Carriers are increasingly eyeing growth prospects associated with a wider range of services, including landside operations. Ports and shipping interests are focused on inland logistics with additional revenue-generation potential. In addition, the sector has witnessed increased efforts by carriers to become freight integrators, and major global container lines are taking actions to acquire regional carriers (UNCTAD, 2021, 2020a). Technology, digitalization and innovation are key components of those new networks.

Challenges

Data for 2019 show that the size of container vessels has continued to increase in terms of capacity (rising by 10.9 per cent compared to 2018). The largest container ships are currently as big as the largest oil tankers and bigger than the largest dry bulk and cruise ships (UNCTAD 2020a). Although benefits arise from economies of scale, large vessels pose serious challenges. UNCTAD (2020a) notes that large vessels:

> "often increase total transport costs across the logistics chain … leads to peak demand for trucks, yard space and intermodal connections, as well as additional investment requirements for dredging and bigger cranes. The concentration of cargo in bigger ships and fewer ports often implies business for a smaller number of companies. The cost savings made on the seaside are not always passed on to clients in the form of lower freight rates. This is more evident in markets such as small island developing states, where only few service providers are in operation. These additional costs will have to be borne by shippers, ports and inland transport providers. Those costs are ultimately passed on to exporters and final consumers."

The above challenge has been magnified by the COVID-19 pandemic. To cope with demand shortage, carriers significantly reduced capacity in the second quarter of 2020. For exporting firms, this meant space limitations for the transportation of goods, delays in delivery dates (affecting supply chains), and increased freight rates for most routes (UNCTAD, 2020a). The pandemic has also highlighted the need for industry players and policymakers to enhance risk management, calibrate risk exposure and ensure resilience-building capabilities (UNCTAD, 2020a).

The size of fishing vessels is also a problem. These are putting pressure on fish stock sustainability, as the size of fishing fleets is not commensurate with available stocks (Vivas and Contreras, 2020). Sustainability has also been challenged by lack of scale and adoption of sustainable fishing measures. Although progress has been made, there are still reports of dumping of waste, such as onboard sewage and bilge water; release of toxic chemicals; transfer of invasive species through ballast water; and physical damage through anchorage, noise, wave disturbances and striking of whales and other marine mammals.[49]

A related challenge is the poor availability of data for assessing risk and monitoring practices. Data are essential for fact-based risk assessment, monitoring the sustainability performance of shipping and port companies, and to ensure fair competition within and across countries. Up to date and transparent information is also a steppingstone to attract investment.

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[48] The Maritime Executive – https://www.maritime-executive.com/article/cruise-industry-ceos-express-confidence-in-the-future-of-cruising.

[49] See IMO website https://www.imo.org/en/MediaCentre/HotTopics/Pages/oceans-default.aspx and PEMSEA, 2015.

4. SCALING UP SUSTAINABLE OCEAN-BASED INDUSTRIES: POLICY OUTLOOK

The UNCTAD SOEC is a unique tool to identify trade trends of the industries that form part of the sustainable oceans economy. It reveals that most subsectors are growing in market size – in particular less traditional subsectors – and that an increasing number of countries are participating in sustainable oceans economy industries, although at varying speeds and facing different constraints. The analysis has also shown that there is a high demand for most ocean-based products and services, and that demand is expected to last over time. The challenge will be to ensure that countries can enjoy the economic benefits of ocean industries in a socially and environmentally sustainable way. This section identifies existing practices aimed at developing sustainable ocean-based sectors and explores how they can be adopted more widely to increase the contribution of these sectors to the economy and the environment.

4.1 Moving towards an integral approach

Previous sections revealed the increasing number of countries, including LDCs and small island developing states, participating in exports of sustainable ocean-based products and services.

Trade trends also show that some of the most successful countries, measured in terms of growing or maintaining their global market share in ocean-based sectors, include China, South-East Asian countries, the United States of America, and high-income European countries. Many factors explain this performance, including unique practices that may be useful for other regions to emulate in order to foster the development potential of ocean-based sectors. These regions are well known for their high level of integration in regional and global value chains, and for their access to capital. Such characteristics, built over several decades, stimulate the development of blue economies.

South East Asian and European Union countries are noteworthy for implementing policy instruments on oceans sustainability. They participate in international platforms (for instance, the UNCTAD's Oceans Forum,[50] the High-Level Panel for Sustainable Ocean Economy,[51] and the Organisation for Economic Co-operation and Development's (OECD's) work on support for sustainable oceans), as well as regional platforms (such as the Partnerships in Environmental Management for the Seas of East Asia [PEMSEA]).[52] PEMSEA supports the sustainable development of businesses operating in coastal and marine areas in East Asia; fosters partnerships within the region, collaborates with international organizations (e.g., convention with the IMO), as well as with other nations. An example worth noting is its partnerships with the Norwegian Institute for Water Research (NIVA) signed during the first half of 2020. NIVA is the leading agency implementing

[50] Within the UN Trade Forum. See https://unctad.org/meeting/un-trade-forum-sdgs-and-climate-change.

[51] This includes Australia, Canada, Chile, Fiji, Ghana, Indonesia, Jamaica, Japan, Kenya, Mexico, Namibia, Norway, Palau and Portugal. For more on the High-Level Panel for Sustainable Ocean Economy see https://www.oceanpanel.org/about-the-panel.

[52] The PEMSEA is an initiative of the "Changwon Declaration Toward an Ocean-based blue economy" signed in 2012. The Changwon Declaration was signed by Cambodia, China, Indonesia, Japan, Lao, Philippines, Republic of Korea, Singapore, Timor-Leste and Viet Nam (Whisnant and Reyes, 2015).

the ASEAN-Norway Cooperation Project which aims to strengthen local and regional capability for preventing and mitigating the environmental threat posed by marine litter and microplastic pollution (PEMSEA, 2020). In the European Union, countries have adopted several programmes supporting ocean-based economies under the umbrella of different institutions, the latest being the European Investment Fund, which provides funds to small and medium enterprizes and start-ups. The European Union differs from PEMSEA in that the former is a legal entity and the latter is an alliance of countries, yet in both cases countries are partnering for the development of their ocean-based economies through regulation and data monitoring.

At present, the most common policy trend across coastal countries is the increasing number of instruments used to promote ocean sustainability. According to OECD data, the number of policy instruments rose from 133 applied by 47 countries in 2000 to 205 applied by 55 countries in 2020.[53] The existing information suggests that, aside from national policies and international initiatives on oceans sustainability, little international cooperation exists for the sustainable trade development of ocean-based economic sectors.

In the current interconnected world, there are abundant examples of the importance of cooperation, including at the subregional and regional level. For example, in fisheries it has been shown that greater international collaboration will help to tackle most issues, such as catch reporting, traceability, trade-information sharing, subsidies discipline, tariff policies, and regulation enforcement (Christiani et al., 2019). Collaboration among stakeholders can help to reap the benefits and tackle the challenges of a sustainable ocean-based economy. Further partnerships, regional coordination and cooperation will necessitate the goodwill of governments and the business sector.

4.2 Coping with market access measures

The future of exports of ocean-based products will depend to a large extent on compliance with health safety standards and other technical measures, which are being made progressively more stringent. For example, food safety oversight and regulations are increasingly extending from "fish to fork". Heightened consumer concerns about a range of food safety matters, and increasingly stringent regulatory standards, pose challenges to sustaining international market access for many suppliers in developing countries (World Fish Center, 2008).

Concerns remain that developing countries lack the skills and other resources needed to meet higher international standards and therefore risk losing market share. Further, the ability of producers and exporters to climb up the value chain also largely depends on their ability to meet these regulations. This holds particularly true for small and medium enterprises. For example, marine fisheries and aquaculture are organized on a small scale in developing countries, and production units are typically scattered and remote. Fishery products often change hands several times before reaching the final export or processing points. The long supply chain may hinder compliance and its documentation and may reduce small fishers and fish farmers' benefits from value additions resulting from improved processing standards (IISD, 2016). Furthermore, market access issues are likely to increase with the growing number of voluntary ecolabels as these are becoming a requirement of business transactions among major producers and purchasers – brand owners, supermarket chains and other seafood retailers such as restaurants. For example, in North America and Europe, ecolabels as prerequisites for obtaining importation contracts affect market access for products from uncertified fisheries, whether they are sustainably managed or not (IISD, 2016).

To ensure that the increasing incidence and prevalence of NTMs does not become a barrier to sustainable ocean-based trade, capacity building efforts will be critical. Training small producers and exporters, as well as local government officials in developing countries, is required to ensure

[53] Data from OECD's OCEAN database (https://stats.oecd.org/index.aspx?datasetcode=OCEAN).

awareness and compliance with international market requirements. For example, following better implementation and enforcement of Hazard Analysis and Critical Control Points (HACCP) procedures, Sri Lanka was able to boost fish exports to the European Union by more than 600 per cent in three years (World Fish Center, 2008). Financial, technical and institutional support by national governments, international donors and large private sector players needs to be ramped up. This is necessary not only to address concerns over production capabilities, but also to help countries bring their testing and conformity assessment systems up to a minimum standard. Setting up laboratories and conducting training and workshops to generate awareness on standards in potential international markets is key to the success of small-scale exporters. Commitments on capacity building can also be integrated in regional trade agreements and other international level agreements. Similarly, setting up local level NTM/VSS focal points that small producers can easily access will be empowering. These can advise on export-related issues, help obtain certification and run awareness programmes at a local level. The FAO and the World Health Organization's training manuals on handling, hygiene and sanitation practices are another good example of this.

Aside from capacity building at a local level, international commitment is important. A good starting point will be for regional trading partners to agree on transparency standards and regulations, accept international standards (such as Codex Alimentarius) where possible, and slowly converge their standards with one another, or at least recognize them as equivalent to their own where possible. Such regulatory cooperation will pave the way for smoother compliance with standards and avoid unnecessary bottlenecks to trade.

4.3 Technology and investment – vital vectors for fostering the growth of sustainable oceans economies

Section 3 underscored that technology is among the main market drivers of most subsectors. However, technological adoption is also one of the major challenges faced by countries across all sectors. Technology is growing at a rapid rate all over the world, including in developed, developing and LDCs. Little information exists about the extent to which global innovation is happening in ocean-based industries. Multinationals are now expanding their reach and support technological start-ups in developing and LDCs. For example, Bright's (2016) study on Sub-Saharan Africa finds 200 African innovation hubs, 3,500 new tech-related ventures, and suggests $1 billion in venture capital to a pan-African movement of start-up entrepreneurs. A most recent article highlights that the number of active tech hubs in Africa grew from 314 in 2016 to 618 in 2019 (Dujmovick, 2019).

Such developments are very promising for the business and public sector, which could benefit from increased use of technologies. At present, most technologies are used by large industries. Promoting the development of technologies, including through start-ups, will help to reduce costs and democratize the use of technologies by small businesses. To move towards that goal, policymakers must act on different fronts, including by facilitating technological adoption. IRENA (2020b) suggests that "the deployment of a given technology may have to contend with market, regulatory and policy barriers. Removal of such barriers is often a low-cost way to accelerate investment. For instance, streamlining permitting and environmental procedures or accelerating timelines could unlock many gigawatts of projects stuck in pipelines around the world".

Closely tied to the above discussion is the need for further investment. Governments and the private sector must devise instruments to accelerate the development of ocean-based industries in a cost-effective and coherent fashion, notably by attracting investment. This will not only require cooperation (discussed in 4.1.) but a framework for the development of investment instruments in sync with environmental, social and governance concerns. Such a framework is increasingly promoted by foreign investors because investment that takes sustainability into consideration is more resilient to the volatility caused by any global crisis, including COVID-19, and delivers better returns during crises (OECD, 2020). It is worth remembering from Section 3 that the business model of some ocean-based industries depends on moving some of their operations abroad, e.g., to be

close to the source of inputs or to reduce logistic and production costs. Furthermore, multinational companies are starting to call on governments for ocean regulation, transparency, traceability and public accountability in their supply chains (Bertarelli, 2020a).

In order to obtain funds for the development of sustainable ocean-based economies, numerous instruments can be considered, including Official Development Assistance, regional banks' funds, and other traditional sources of investment. New forms of financial instruments are increasingly being used by coastal countries. Examples of such instruments include blue bonds, crowdfunding and crowd-investing, blended finance, etc. (Bertarelli, 2020b; Tonazzini et al., 2019). As is well known, the extent to which countries will be able to attract funds will depend on their investment policies, as well as their strategies to ensure oceans sustainability and macro-economic stability. [54]

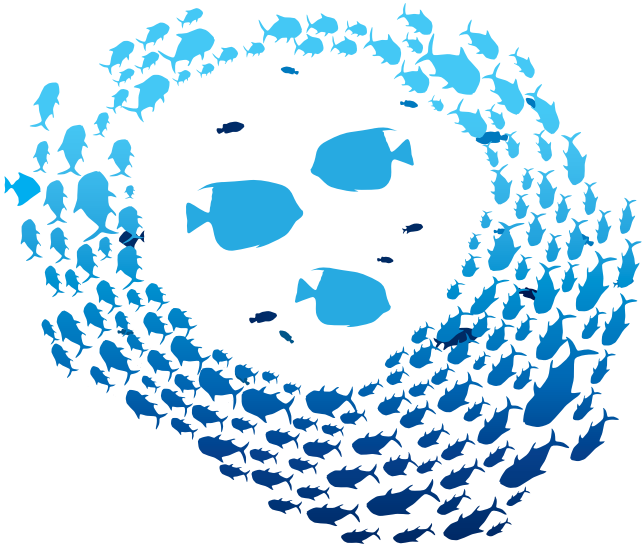
In addition to cooperation, technology and investment, regulations and law enforcement will be key stepping stones for the development of sustainable ocean-based industries. For this, the only thing that is needed is will.

[54] For more on financing sustainable oceans economies, see for example UNEP (https://www.unepfi.org/blue-finance/); OECD (https://doi.org/10.1787/c59ce972-en); Ocean Panel (https://oceanpanel.org/sites/default/files/2020-10/Ocean per cent20Finance per cent20Full per cent20Paper.pdf); and WEF (http://www3.weforum.org/docs/WEF_FOA_The_Ocean_Finance_Handbook_April_2020.pdf).

5. CONCLUDING REMARKS IN THE CONTEXT OF COVID-19

Countries' stability and resilience have been tested by COVID-19. In most countries, the pandemic has brought to light the weakness of their labour market: "Some 1.6 billion informal workers, or 80 per cent of the planet's total, have been let go, either amid closures in hard-hit sectors or simply due to lockdown constraints" (IRENA, 2020b). During the various lockdowns and periods of restriction, as well as now, many families are struggling to make ends meet; a challenge particularly severe in developing countries that do not have in place social safety nets, and labour markets that rely on temporary labour, such as tourism, fisheries and seafaring services. COVID-19 has also unveiled the urgency for resilient and sustainable business, i.e., business that is mindful and respectful of rules, such as SPS measures, environmental regulations (such as ocean spatial management) and social progress. It has also highlighted the lack of product and market diversification, and the necessity for industries to move towards more value-added products. Countries that have suffered the most are those highly dependent on a few commodities or services (e.g., on tourism) and in which industries are adding little value to raw material.

Investing in ocean-based economies can help overcome the economic slump caused by COVID-19 and create much-needed jobs, both in the short-term and beyond. UNCTAD's SOEC is a step towards that goal. It provides a comprehensive overview of all subsectors and their value chains in which government and business can work – within and across borders. It allows the assessment of ocean-based industries and hence the prioritization of specific sectors for the development and economic growth of coastal countries. UNCTAD's SOEC can enhance data transparency, which is critical for the good management of resources, designing trade and environmental policies, and attracting investment. The report also reveals important data gaps on ocean-based industries. These data are more necessary than ever: governments cannot afford to draft policies and strategies that are not fact-based, and investors and businesses will only take steps to develop an industry if they have data indicating its potential. UNCTAD's SOEC can be a key tool for achieving this objective.



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Annexes

Annex 1: Methodology

This section provides all relevant methodological background relating to international trade in goods and services statistics utilized in the analysis of the report. The data source for trade data on goods and for maritime transport services was UNCTADStat (https://unctadstat.unctad.org/EN/), and for tourism WTTC (https://wttc.org/).

Product codes

UNCTAD's SOEC for goods uses the HS international classifications, revision 2017. Given that many countries reported data for the years 2015 and 2016 in HS revision 2012, and data for 2017 and 2018 in HS revision 2017, the first step was to identify the correspondence codes between HS 2017 and HS 2012. Because some HS codes, particularly codes relating to fisheries, have multiple correspondences, this report uses the HS codes, revisions 2012 and 2017, identified by FAO for marine fisheries.

In the case of services, the classification uses the BPM/EBOPS international classification. The UNCTADStat database uses a somewhat different service codification. To determine whether data on sustainable ocean-based services were available, a table of correspondence between the two nomenclatures was created.

Level of aggregation of the data

A commonly recognized hurdle in any analysis of goods and services is the level of aggregation of international classifications, not least for HS and the BPM/EBOPS. Products and services codes usually do not dissociate between land-based and ocean-based industries, and in many cases several industries are grouped into one single code. Although, in the case of goods, this problem can be somewhat solved by national tariff line codes as almost all countries create sub-categories to existing international classifications, this is not possible at the global level since tariff line codes can differ across countries. Because of the partial coverage of international classifications for certain industries, a coefficient was calculated using studies on the size of subsectors. Whenever possible, the coefficient was tailored to the specific characteristics of the country, such as the development of the industry and the importance of the ocean-based industry relative to the land-based industry. For example, in the tourism sector, the coefficient is 100 per cent for most small island developing states, 80 per cent for the United States of America but 50 per cent for France.

The table below provides further detail about the criteria used for each subsector for which a coefficient was calculated. The reports mentioned in the table are listed in the bibliography, under References or Sources.

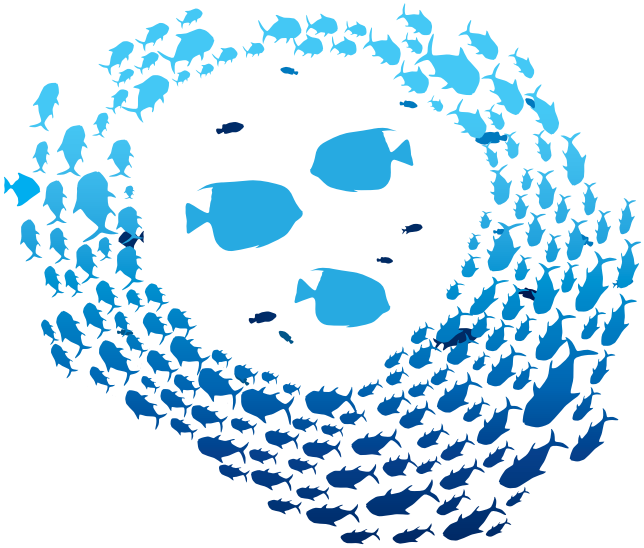

Table 15. Criteria for determining coefficients

Subsector	SOEC codes	Criteria	Coefficient different across countries
Sea salt	D1	Coastal countries only. Price (50% above rock salt in key market). Quantity (sea salt use has continually grown over the past 10 years; share of sea salt in total production (volume) was 33% in 2008). Values reported in reports.	No
Natural sea sand	D2	Coastal countries only. Reports on regulations and production.	No
Cargo handling equipment and related supporting appliances	E21	Ship builder only. Data in OECD (2019) were used to estimate the equivalent value for the 2015–2018 period	Yes
Navigation aids, communications and IT systems appliances and equipment for maritime transport and ports/Part of vessels and other inputs n.e.c. specific to maritime transport and ports	E22/E23	Coastal countries: all; ship builder: all. Reports on regulations and production of main shipbuilders find that. . . Data in OECD (2019) publication were used to estimate the equivalent value for 2015–2018 period. Economies such as the Republic of Korea or smaller, usually import a larger share of inputs. For example, a study on the Philippines shows that the country imports almost all inputs used for the production of ships.	Yes
Medicines (Pharmaceuticals)	F31	Coastal countries: all.	No
Vitamins and food supplements	F32	Large pharma industry in landlocked countries.	No
Cosmetics and chemicals	F34	Data in several reports were used to estimate the value for 2015–2018.	No
Other electrical equipment, machineries, and appliances for other marine industries	F5	Data in several reports were used to estimate the value for 2015–2018.	No
Marine and coastal tourism	G	Coastal countries only. Tonazzini et al. (2019) and information collected from some individual countries were used to estimate the coefficient.	Yes

Data coverage

The latest year for which data were available at the time of the report drafting was 2018. To have the greatest number of countries covered in 2018, country coverage for 2018 was completed with data for 2019 or 2017 (for 12 developing countries). To fill the data gaps and thereby increase country coverage, an attempt was also made to calculate mirror data, i.e., data reported by importers for countries for which data were missing. However, the results showed an exceedingly large variation with data reported by the country in other years. That difference could not be explained by the fact that imports are reported in CIF values (cost insurance and freight) and exports are FOB (free on board); the difference was expected to be 10 to 20 per cent.[55] The source of discrepancy may be the way in which the product was recorded: products may have been recorded in a different category; different dates of accounting for exports and imports may have been applied; the customs declaration may have been inaccurate; the moment of transfer of goods across the state borders of counterpart countries; or differences in methodology applied; or corruption of customs authorities.

To make sure trends are not falsely identified due to differences in yearly data coverage, and to ensure that the greatest number of countries are part of the analysis, the period covered for the trends analysis is 2015 to 2018. That is, only countries for which data were available during those years were included.

[55] WITS website: https://wits.worldbank.org/wits/wits/witshelp/Content/Data_Retrieval/T/Intro/B2.Imports_Exports_and_Mirror.htm.

Annex 2: Environmental and health concerns caused by ocean-based sectors and commonly used NTMs to respond to them

SOEC_Chapter	Environmental (TBT) and health (SPS) concerns	Most commonly used NTMs (per international classification for NTMs) – national and international **
Fisheries and aquaculture	**Capture** 1. IUU fishing 2. Biosecurity 3. Contaminants in wild and farmed seafood (methylmercury, persistent organic pollutants, and production drugs) 4. Environmental chemicals, micro-organisms, pesticides, and veterinary drugs 5. Destructive fishing practices 6. Energy use and GHG emissions 7. Fisheries subsidies **Aquaculture** 8. Waters eutrophication 9. Nutrient and effluent build-ups 10. Alteration or destruction of natural habitats 11. Introduction and transmission of aquatic animal diseases 12. Contaminants in wild and farmed seafood (methylmercury, persistent organic pollutants and production drugs) 13. Impacts on the local environment of aquaculture sites associated with the chemicals used on farms, effluent discharge, disease transmission between farmed and wild species, concentration of fish waste, and fish escapes 14. Infectious disease outbreaks and loss of large amounts of farm-raised seafood 15. GMOs or use of transgenics 16. GHG emissions 17. Waste generation: manufactured feed containing antibiotics, pesticides and nutrients, in combination with the large amounts of faeces produced by high density stocking pollute aquatic environments surrounding farms	A31 Labelling requirements for SPS reasons A42 Hygienic practices during production related to SPS conditions A64 Storage and transport conditions A82 Testing requirements for SPS reasons B6 Product identity requirements B31 Labelling requirements for TBT reasons Chapter L in diverse forms
Processed seafood	1. Microplastics 2. Waste generated during packaging and handling resulting in disposal and pollution problems 3. Loss of valuable biomass and nutrients if not recovered by appropriate methods and technologies for upgrading, bioconversion or re-utilization 4. Concerns over water safety, clean contact surfaces, cross-contamination prevention, pest control, adulterant protection 5. Lack knowledge, skills or ability to invest in new equipment and ideas, resulting in unhygienic conditions during handling and processing of fish causing spoilage, contamination with disease-causing germs, and a loss of income as fish are sold for a low price 6. *Clostridium perfringens* – important causal agents in "food poisoning" 7. *Collinsella aerofaciens* – contributes to a whole host of digestive system problems, including irritable bowel syndrome 8. *Coxiella burnetii* – responsible for "Q fever", a flu-like disease that can be deadly	A31 Labelling requirements for SPS reasons A33 Packaging requirements for SPS reasons A64 Storage and transport conditions A82 Testing requirements for SPS reasons B7 Product quality, safety or performance requirements B33 Labelling requirements for TBT reasons

Sea minerals	1. Microplastics in sea salt – reduction in diversity and abundance of fish in mined areas and changes to riverside vegetation 2. Sand mining – pressure on rivers, floodplains and deltas 3. Reduction in diversity and abundance of fish in mined areas and changes to riverside vegetation	A42 Hygienic practices during production related to SPS conditions A82 Testing requirements for SPS reasons B21 Tolerance limits for residues of or contamination by certain (non-microbiological) substances
Ships, port equipment and parts thereof	n/a	n/a
High technology and other manufactures n.e.c.	1. Presence of microplastics in pharmaceutical and personal care products 2. Unclean, unsmooth and porous surfaces of seafood processing equipment resulting in contamination by bacteria 3. Poorly designed seafood processing equipment resulting in external contamination 4. Improper exterior resulting in harbouring of soils, bacteria or pests in and on the equipment itself, as well as in its contact with other equipment, floors, walls or hanging supports	A31 Labelling requirements for SPS reasons A41 Microbiological criteria of the final product A42 Hygienic practices during production related to SPS conditions B7 Product quality, safety or performance requirements B31 Labelling requirements for SPS TBT reasons B82 Testing requirements for SPS reasons

Sources: Global Aquaculture Alliance (2019) ; Gormaz et al. (2014); IISD (2016); Louisiana Fisheries Forward (2015); and Godfrey (2020).
** All NTM codes are based on the international classification of NTMs.

Annex 3: UNCTAD's sustainable ocean-based subsectors (Level 1)

Goods

SOEC code	SOEC description
A1	Finfish
A2	Crustaceans
A3	Molluscs
A4	Aquatic invertebrates other than crustaceans
A5	Other living marine products
C1	Prepared and preserved fish, crustaceans and molluscs
C2	Flours, meals and pellets, of fish or crustaceans, molluscs, or other aquatic invertebrates
C3	Fats and oils of fish or marine mammals, whether or not refined
C4	Processed meals and dishes
D1	Sea salt
D2	Natural sea sand
E1	Vessels
E2	Parts of vessels and inputs supporting navigation and ports
F1	Manufactures for the fishing and aquaculture industries, excludes vessels and parts thereof
F2	High technology manufacture for environmental sustainability and clean energy
F3	Pharmaceuticals and chemicals made of marine organisms, and related appliances equipment
F4	Manufacture of coastal and marine sport goods, textile articles (except apparel) and other materials
F5	Other electrical equipment, machineries and appliances for other marine industries

Services

SOEC code	SOEC description
G1	Hotels and restaurants (incl. catering)
G2	Travel agencies and tour operator services
G3	Tourist guide services
G4	Recreational and other services
H1	Services incidental to fishing and aquaculture
H2	Fish and seafood processing and packaging
H3	Commercialization and distribution of fish and other marine products
I1	Passenger transportation
I2	Freight transportation
I3	Auxiliary services to maritime transport
I4	Marine insurance and finance
J1	Port and harbour operations, including marine cargo handling
J2	IT, and other automated services for ports facilities
J3	Warehousing and storage
J4	Navigational services on coastal and transoceanic waters
J5	Marine-related engineering and construction
K1	Sewage services
K2	Waste treatment and disposal services located by the coast
K3	Containment, control and monitoring services, and other site remediation services n.e.c.
K4	Coastal and oceans habitat protection, preservation, and restoration
K5	Other environmental protection services
L1	R&D services and related education
L2	Interdisciplinary R&D services on environment, oceanography and the like
L3	Technical testing and analysis services
L4	Scientific and technical consulting services

Energy

SOEC code	SOEC description
M1	Offshore wind energy
M2	Tidal power
M3	Wave power
M4	Submarine geothermal energy
M5	Chemical potential of seawater
M6	Marine biomass-based biofuels
M7	Power plants/projects

Source: UNCTAD (2021).

UNCTAD/DITC/TED/INF/2021/2