

Korea's Ocean Economy 2018

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1 Introduction

- *Ocean has emerged as a new solution.*
- *Examining the trends of individual industries constituting the ocean economy.*
- *To help ocean economy experts and policy-makers more easily understand Korea's ocean economy and specific industries.*
- *Analyze eight ocean and fisheries industries in accordance with the Classification of Korea's Ocean and Fisheries Industries.*

■ Background

Under the background of humans seeking new growth engines due to the slower growth of the global economy and the depletion of land resources, the ocean has emerged as a new solution to the issue. Many ocean countries have recently shifted their focus on economic development based on the ocean and have devised national development plans in the field of the ocean, raising their policy position and presenting blueprints for ocean-based economic development.

Even though the OECD (2016)*, WWF (2015)**, and many other organizations have made global efforts to assess the global ocean economy, we have yet to resolve the following three issues: about lack of 1) unified concepts and evaluation methods for the ocean economy; 2) comparability between the national economy and the ocean economy; and 3) connection between global and national assessments.

At this point, it is urgently necessary to regularly assess and analyze Korea's ocean economy. In other words, the size and status of Korea's ocean economy should be diagnosed, examining the trends of individual industries constituting the ocean economy, and looking into the potential of Korea's ocean economy based on these plans.

* OECD, The Ocean Economy in 2030, 2016

** WWF, International, Reviving the Ocean Economy: The case for action-2015, 2015

▪ Objectives

This paper aims to diagnose the scope and size of Korea's ocean economy and the recent trends of individual industries and to help ocean economy experts and policy-makers more easily understand Korea's ocean economy and specific industries.

▪ Target industries

Focusing on industrial activities, this report is designed to analyze ten ocean and fisheries industries in accordance with the 2018 Special Classification of Korea's Ocean and Fisheries Industries using 2014 Input-Output tables of Bank of Korea.

2 Key Findings

- *As of 2014, the gross output of Korea's ocean and fisheries industries was valued at KRW 147.0 trillion, with the value added to the industries being estimated at KRW 38.9 trillion.*
- *The value added to Korea's ocean and fisheries industries dived from KRW 42.1 trillion in 2013 to KRW 38.9 trillion in 2014.*

As of 2014, the gross output of Korea's ocean and fisheries industries was valued at KRW 147.0 trillion, with the value added to the industries being estimated at KRW 38.9 trillion and accounting for about 2.9% of that of the Korean economy. Employees/workers numbered about 596,000 based on Input-out put statistics. The vessel and offshore plant construction and repair industry, marine and fisheries services, the shipping industry, the port industry, and the fisheries industry (fisheries production, processing, and distribution) took up 31.0%, 27.0%, 11.8%, 5.1%, and 17.3% of the ocean and fisheries industries as a whole, respectively, in terms of value added. Marine and fisheries services employed the highest number of workers, followed by the vessel and offshore plant construction and repair industry, the shipping industry, and the fisheries distribution industry.

- This is directly attributed to a fall in the value added of the ship-building industry coming from the global economic slump and the resulting drop in the amount of shipbuilding orders received.

Table 1 Output and value added by ocean and fisheries industries

Unit: KRW 1 trillion, persons, %

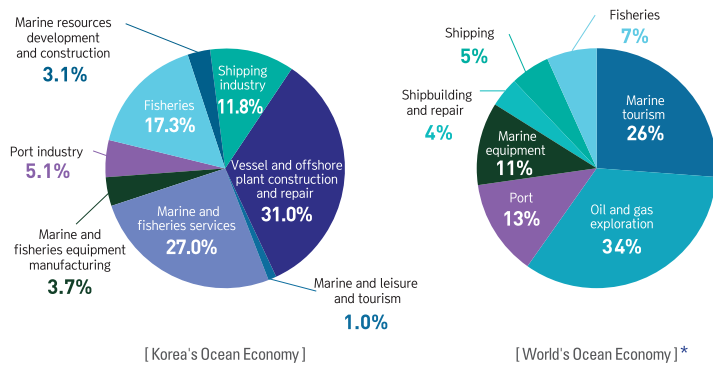
Sector	Gross output	Share (%)	Value added	Share (%)	Employment	Share (%)
Marine resources development/ construction	2.6	1.8	1.2	3.1	13,739	2.3
Shipping industry	30.5	20.7	4.6	11.8	70,279	11.8
Port industry	5.0	3.4	2.0	5.1	27,494	4.6
Vessel and offshore plant construction and repair	64.2	43.7	12.0	31.0	131,418	22.0
Fisheries production	7.6	5.2	3.1	8.0	44,990	7.5
Fisheries processing	9.4	6.4	1.3	3.4	40,655	6.8
Fisheries distribution	4.7	3.2	2.3	5.9	65,827	11.0
Marine leisure and tourism	1.2	0.8	0.4	1.0	10,985	1.8
Marine and fisheries equipment manufacturing	5.4	3.7	1.4	3.7	18,701	3.1
Marine fisheries services	16.4	11.1	10.5	27.0	172,071	28.9
Total (ocean and fisheries industries)	147.0	100.0	38.9	100.0	596,160	100.0
Whole industry	3,658.0	-	1,354.9	-	23,567,991	-
% of the marine and fisheries industries in the whole industry	4.0%		2.9%		2.5%	

* Current market prices and transaction table of domestic goods and services, as of 2014

According to Figure 1, the value added to Korea's ocean and fisheries industries dived from KRW 42.1 trillion in 2013 to KRW 38.9 trillion in 2014. This is directly attributed to a fall (KRW 3.2 trillion) in the value added of the ship-building industry coming from the global economic slump and the resulting drop in the amount of ship-building orders received. This also relates to the fact that the ship-building industry, the shipping industry, and the port industry account for 31.0%, 11.8%, and 5.1% of Korea's ocean and fisheries industries, respectively, in terms of value added; making the industries relatively more sensitive to changes in global economic situations.

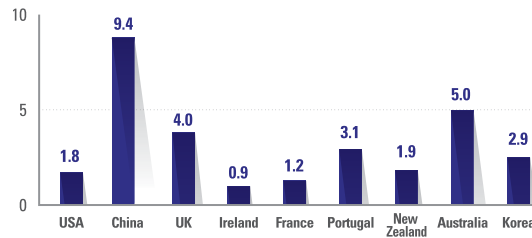
In global contexts, as of 2010 (OECD), the value added of the world's ocean industries was estimated at US\$ 1.5 trillion. More specifically, the offshore oil and gas exploration and production industry and the marine tourism industry, which rely on marine resources, accounted for 34% and 26% of the global ocean industries in value added, respectively, while the shipbuilding and equipment manufacturing industry, the shipping industry, and the port industry took up 15%, 5%, and 13% respectively, in the same context.

Figure 1 Changes in the value added of Korea's ocean and fisheries industries



* OECD, The Ocean Economy in 2030, 2016

Figure 2 Value added of the ocean economy in ocean countries



	USA	China	UK	Ireland	France	Portugal	New Zealand	Australia	Korea
The share of the ocean economy in GDP	1.8	9.4	4.0	0.9	1.2	3.1	1.9	5.0	2.9
Number-one industry	Tourism (36.1%)	Marine tourism (17.1%)	Oil and gas (51.1%)	Shipping (29.7%)	Marine tourism (48.3%)	Marine tourism (35.5%)	Marine mineral resources (48.3%)	Oil and gas (41.4%)	Vessel and offshore plant (31.0%)
Number-two industry	Oil & gas exploration/production and gravel collection (33.4%)	Shipping (8.5%)	Shipping (18.2%)	Tourism (27.3%)	Oil & gas (14.2%)	Fisheries (25.7%)	Shipping (24.2%)	Marine tourism (38.4%)	Marine and fisheries services (27.0%)

* The share of the ocean economy in GDP (USA, Australia, and France) was calculated by using GDP data from OECD national accounts.

** Number one and two industries in China refer to those whose share in key marine industries (excluding ocean-related industries and the public sector in the marine industry) is significant.

*** USA:Economic National Ocean Watch, National Ocean Economics Program; China:China Marine Economic Information Network; UK: Marine Science Co-ordination Committee; Ireland:Socio-Economic Marine Research Unit; France:Ifremer, Institut français de recherche pour l'exploitation de la mer; Portugal: National Statistical Institute; New Zealand:Statistics New Zealand; Australia:Australian Institute of marine science; Korea: Korea Maritime Institute

3 Sectoral Findings

(1) Fisheries industry

- *Fisheries are deemed to be a very important food industry, providing Korean people with fish and fishery products rich in high-quality animal protein.*
- *The future direction of policies for fisheries and fishing villages have been emerging as key issues in the era of the 4th Industrial Revolution.*

Fisheries refer to an industry where aquatic animals and seaweeds in oceans, rivers, and lakes are caught, raised, processed, and distributed. The fisheries industry is defined slightly differently by related laws including the Fisheries Act and the Framework Act on Fisheries and Fishing Villages Development. Separately from the legal definitions, this report classifies fisheries into fisheries production, fisheries processing, and fisheries distribution in accordance with the Special Classification of Korea's Ocean and Fisheries Industries released by Statistics Korea.

According to the 「2016 Survey of Fisheries」 conducted by the Ministry of Oceans and Fisheries, the number of fisheries companies were 125,283 in 2015. The exports and imports of fishery products totaled US\$ 2.13 billion and US\$ 4.79 billion, respectively, with imports soaring every year. As of 2015, Korea's annual per capita consumption of fishery products amounted to 59.9kg and its self-sufficiency rate of fishery products was estimated at 71.5%.

Fisheries are deemed to be a very important food industry, providing Korean people with fish and fishery products rich in high-quality animal protein. Also, exporting fish and fishery products, the industry has played a key role in acquiring foreign currencies, creating jobs in fisheries and related industries, maintaining local culture, and preserving the marine environment and fulfilling multifunctionality. However, many issues have yet to be fully resolved, which include a fall in the fish catch due to the depletion of fishery resources in coastal and inshore areas and low value added ratios of the fisheries processing industry. In particular, reacting to rapidly changing mega trends and setting the future

direction of policies for fisheries and fishing villages have been emerging as key issues in the era of the 4th Industrial Revolution.

Fisheries production	Fisheries processing	Fisheries distribution
▪ Fishing ▪ Aquaculture ▪ Services incidental to fishing and aquaculture ▪ Salt production	▪ Aquatic animal processing and storage ▪ Seaweed processing and storage ▪ Salt processing ▪ Other fisheries processing	▪ Fisheries brokering and wholesale / retail ▪ Fisheries transportation and storage

Table 2 Macro-indicators for the fisheries industry

Unit: KRW 1 billion, 1,000 persons, %

		2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output		22,423	23,739	22,911	25,308	21,731	-3.1
Value added		7,271	7,812	7,347	8,059	6,731	-7.4
Fisheries population		171	159	153	147	141	-17.5
Trade (US\$ 1 million)	Exports	1,798	2,308	2,361	2,151	2,067	15.0
	Imports	3,458	4,192	3,975	3,895	4,506	30.3
	Trade balance	△1,660	△1,884	△1,614	△1,744	△2,439	46.9

* Statistics Korea

▪ Fisheries production (fishing and aquaculture)

- *Fisheries production is recently characterized by a fall in the catch of coastal and offshore fisheries and a rapid rise in aquaculture based on seaweeds.*
- *In 2014, the gross output of the fisheries industry was valued at KRW 7.6 trillion, with the value added reaching KRW 3.1 trillion.*

Pursuant to the Enforcement Ordinance of the Framework Act on Fisheries and Fishing Villages Development, fishing and aquaculture consist of marine fishing, freshwater fishing, marine aquaculture, inland aquaculture, salt production, seeding of aquatic animals and seaweeds, and aquarium fish culture. According to the Special Classification of Korea's Ocean and Fisheries Industries, fisheries production is composed of fishing, aquaculture, services incidental to fishing and aquaculture, and salt production

In 2017, Korea's fisheries production amounted to 3.75 million tons (KRW 8.6190 trillion), with the catch of coastal and offshore fisheries, aquaculture production, and the catch of distant-water fisheries amounting to 930,000 tons, 2.32 million tons, and 470,000 tons, respectively. As of 2016, the number, displacement, and horsepower of fishing vessels were estimated at 66,970, 535,000 tons, and 14.62 million, respectively. Aquaculture licenses totaled 9,955, covering an area of 153,452 ha. As the fisheries production base, national fishing ports, regional fishing ports, and fishing village fishing ports across the nation numbered 111, 281, and 613, respectively.

Fisheries production is recently characterized by a fall in the catch of coastal and offshore fisheries and a rapid rise in aquaculture based on seaweeds. In 2016, the catch of coastal and offshore fisheries plummeted to less than 1 million tons, causing Korea's fisheries industry to be greatly shocked and feel a sense of crisis in connection with a fall in the amount of marine resources. As a result, the Korean government has come up with diverse measures to manage fishery resources, expanding TAC(total allowable catch), carrying out a 'Fisheries Closures', and implementing tougher regulations on fishing gear and methods. Contrasted with a drop in the amount of resources in coastal and inshore areas, aquaculture production has skyrocketed. However,

seaweeds account for more than 75% of aquaculture production, occupied by a significant portion of sea mustard and kelp, feeds for abalone. In the future, the aquaculture industry should establish a basic framework to stably produce seafood highly preferred by Korean people and to add value thereto, which is deemed to be a very important task.

Fishing	Aquaculture
▪ Marine fishing (coastal and offshore, distant-water) ▪ Freshwater fishing	▪ Marine aquaculture ▪ Inland aquaculture ▪ Aquarium fish and seaweed culture
Services incidental to fishing and aquaculture	Salt production
▪ Fish transportation ▪ Other services incidental to fishing and aquaculture	

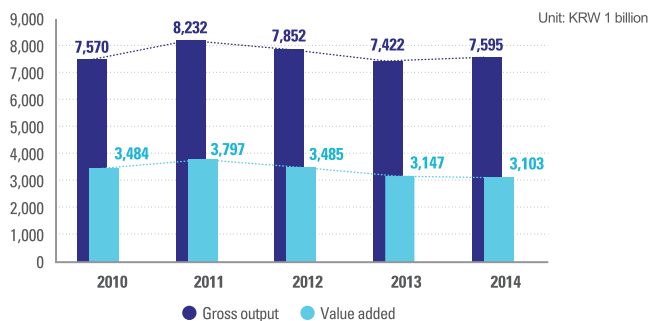
In 2014, the gross output of the fisheries industry was valued at KRW 7.595 trillion, up 0.3% from 2010, with the value added reaching KRW 3.103 trillion, down 10.9% from 2010. Employees/workers numbered 44,990, down 20.4% from 2010.

Table 3 Output and value added in fishing and aquaculture

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	7,570	8,232	7,852	7,422	7,595	0.3
Value added	3,484	3,797	3,485	3,147	3,103	-10.9
Number of employees	56.5	49.0	49.1	47.3	45.0	-20.4

Figure 3 Output and value added in fishing and aquaculture



▪ Fisheries processing

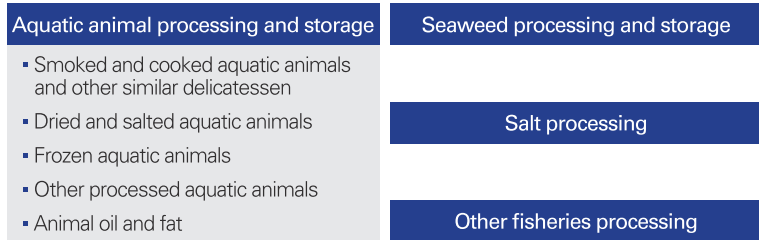
- *The trends of fishery consumption in Korea include products getting simple to cook, becoming more diversified and high-quality oriented thanks to the increase of single-member and two-member households, population aging, and various food life styles.*
- *As of 2014, the gross output of the fisheries processing industry was valued at KRW 9.4 trillion, with the value added reaching KRW 1.3 trillion.*

In accordance with the Enforcement Ordinance of the Framework Act on Fisheries and Fishing Villages Development, fisheries processing consists of aquatic animal processing, seaweed processing, animal oil and fat manufacturing, and salt processing. According to the Special Classification of Korea's Ocean and Fisheries Industries, fisheries processing is composed of aquatic animal processing and storage, seaweed processing & storage, salt processing, and other fisheries processing.

In accordance with the 2016 fisheries processing statistics released by the Ministry of Oceans and Fisheries, fisheries processing companies and workers across the nation numbered 5,358 and 78,548, respectively while processed fisheries production amounted to about 1.57 million tons and was valued at KRW 5.9629 trillion. Among diverse processed fishery products, frozen fishery products, which are deemed to be more simply processed products, accounted for 49.3% of the total production while seasoned processed fishery products, seaweeds, and fish jelly products took up 12.9%, 11.7%, and 7.6%, respectively.

The fishery processing industry has quickly changed both internally and externally. The trends of fishery consumption in Korea include products getting simple to cook, becoming more diversified and high-quality oriented thanks to the increase of single-member and two-member households, population aging, and various food life styles. Moreover, people have demanded better fishery products in quality, sanitation, and safety. Against this backdrop, a basic framework for industry sophistication should be set up for the fisheries processing industry to take another leap forward via the expansion of export. However, the internal environment and infrastructure of the industry have yet to meet such internal and external needs. The fisheries processing industry should make more efforts to develop and commercialize processed foods

reflecting diverse consumer preferences and needs and take a leap forward to becoming a global export industry.



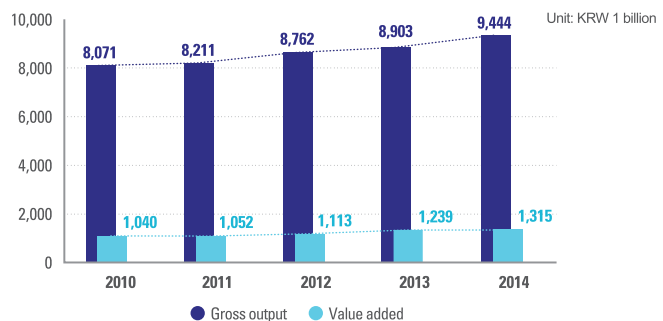
As of 2014, the gross output of the fisheries processing industry was valued at KRW 9.444 trillion, up 17.0% from 2010, with the value added reaching KRW 1.315 trillion, up 26.4% from 2010. Employees/workers numbered 40,655, up 3.5% from 2010.

Table 4 Output and value added in fisheries processing

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	8,071	8,211	8,762	8,903	9,444	17.0
Value added	1,040	1,052	1,113	1,239	1,315	26.4
Number of employees	39.3	36.6	38.3	39.4	40.7	3.5

Figure 4 Output and value added in fisheries processing



▪ Fisheries distribution

- *At present, Korea's fisheries distribution industry has limitations in actively reacting to changes in distribution systems due to outdated facilities, low value-added distribution based on original fishery products, and small-sized businesses.*
- *As of 2014, the gross output of the fisheries distribution industry was valued at KRW 4.7 trillion, with the value added reaching KRW 2.3 trillion.*

Pursuant to the Enforcement Ordinance of the Framework Act on Fisheries and Fishing Villages Development, fisheries distribution consists of fisheries sale, transportation, and storage. According to the Special Classification of Korea's Ocean and Fisheries Industries, fisheries distribution is composed of fisheries brokerage/wholesale/retail and fisheries transportation/storage.

According to the 「2016 Survey of Fisheries」 conducted by the Ministry of Oceans and Fisheries, workers and companies in fisheries distribution numbered 126,868 and 40,034, respectively. As of 2016, local wholesale markets across the nation numbered 213 and the volume of fisheries traded through the markets* amounted to 1.144 million tons. Among local wholesale markets across the nation, a total of 18 markets dealt with fishery products and the volume of fishery products traded via such markets amounted to 414,000 tons. On the other hand, according to the survey of the fisheries distribution industry carried out by the Ministry of Oceans and Fisheries, fishermen's share and the percentage of distribution costs were estimated at 48.2% and 51.8%, respectively, on average, in connection with four major fish species such as hairtail, mackerel, squid, and pollack.

At present, Korea's fisheries distribution industry has limitations in actively reacting to changes in distribution systems due to outdated facilities, low value-added distribution based on original fishery products, and small-sized businesses. In particular, even though the sanitation and safety of fishery foods have been more highly emphasized, voluntary efforts internally made by the industry are not enough to further develop a basic system for quality and sanitation management.

* This means that fisheries are released via NFFC's (National Federation of Fisheries Cooperatives) distribution systems (local wholesale markets).

Against this backdrop, the Ministry of Oceans and Fisheries devised and released the Fisheries Distribution Innovation Roadmap (2018~22) in June 2018. This roadmap contains specific action plans to enhance the sanitation of fishery products in wholesale and retail markets, improve low-temperature distribution systems, stabilize prices by controlling the distribution of fishery products, and establish a basis for the fisheries distribution industry to take another leap forward. The efficient implementation of such plans is expected to make contributions to strengthening the competitiveness of the distribution industry, improving the sanitation and quality of fishery products, and adding more value to such products.

Fisheries brokerage, wholesale, and retail	Fisheries transportation and storage
▪ Fisheries brokerage (home and abroad) ▪ Fisheries wholesale ▪ Aquarium fish and seaweed wholesale and retail	▪ Fisheries transportation ▪ Cold storage warehouse for fisheries

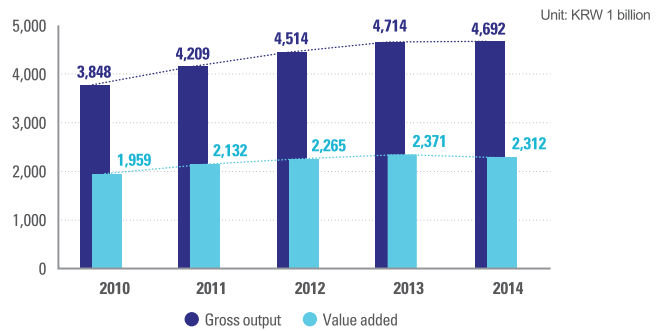
As of 2014, the gross output of the fisheries distribution industry was valued at KRW 4.692 trillion, up 21.9% from 2010, with the value added reaching KRW 2.312 trillion, up 18.1% from 2010. Employees/workers numbered 65,827, up 8.0% from 2010.

Table 5 Output and value added in fisheries distribution

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	3,848	4,209	4,514	4,714	4,692	21.9
Value added	1,959	2,132	2,265	2,371	2,312	18.1
Number of employees	60.9	62.8	64.6	64.5	65.8	8.0

Figure 5 Output and value added in fisheries distribution



(2) Shipping industry

- *Korea's port throughput for import and export amounted to 1.31 billion tons in 2017.*
- *About 99.7% of Korea's international traffic for export and import goes through marine transportation.*
- *As of 2014, the gross output of the shipping industry was valued at KRW 30.5 trillion, with the value added reaching KRW 4.6 trillion.*

The shipping industry is classified into passenger transportation, freight transportation, and other shipping services supporting transportation. The transportation industry consists of oceangoing transportation crossing borders and coastal water transportation not crossing borders.

Other shipping services are composed of ① tug business operating tugboats, ② brokerage services where freight and chartering or hiring of vessels are brokered, ③ agency services where shipping-related business is conducted on behalf of shipping service providers, ④ ship lease services, ⑤ ship management services where ships and crew are managed, ⑥ suppliers of lubricant and articles for ships.

Passenger transportation	Freight transportation	Other shipping services
▪ Oceangoing passenger transportation ▪ Coastal water passenger transportation ▪ Other passenger transportation	▪ Oceangoing freight transportation ▪ Coastal water freight transportation	▪ Tug business ▪ Brokerage and agency ▪ Ship lease ▪ Ship management ▪ Suppliers of lubricant and articles for ships

Oceangoing freight transportation accounts for the highest share of the shipping industry. This freight transportation is further segmented into container shipping, dry cargo shipping, oil shipping, and specialized shipping depending on the characteristics of ships and freight transportation. For export-oriented countries such as Korea, the shipping industry acts as logistics infrastructure for export and import, making big contributions to the development of national economy.

Korea's port throughput for import and export amounted to 1.31248 billion tons in 2017 (imports: 860.36 million tons; exports: 452.12

million tons). About 99.7% of Korea's international traffic for export and import goes through marine transportation. More than 160 shipping companies in Korea import and export those cargoes. Transporting such exported and imported freight, as well as marine transportation for third markets, shipping companies earned KRW 29.5379 trillion in 2017. The companies made US\$ 14.6 billion by transporting Korea's exports and third nations' goods. Adding foreign currencies earned via passenger transportation and hiring of vessels thereto, Korea's oceangoing transportation industry earned a total of US\$ 18 billion in 2017.

In particular, the oceangoing freight transportation industry is exposed to big volatility in market prices (freight rates, ship prices, etc.) due to global economic fluctuations and inflexible supply of ships. To manage such market risks, shipping companies and freight owners can rely on long-term contracts or use shipping derivatives in dry cargo and oil shipping markets.

Port throughput via coastal water transportation amounted to 125.91 million tons in 2017. Coastal water freight transportation companies in Korea totalled 758, owning a total of 2,023 vessels. Korea's passengers using coastal water transportation services numbered 16.91 million in 2017. Coastal water passenger transportation companies in Korea totalled 68, owning a total of 168 vessels.

Hanjin Shipping, Korea's number one shipping company, applied for court receivership in 2016 and was liquidated in 2017. Therefore, the Korean government and shipping companies are desperately required to make more efforts to rebuild a shipping industry suitable for a trading nation. Against this backdrop, the Korean government set up Korea Ocean Business Corporation in July 2018 in order to help shipping finance, operate the National Essential Shipping System, and provide scrap subsidies in a more efficient way.

On the other hand, the International Convention for the Control and Management of Ships' Ballast Water and Sediments whose implementation was delayed for two years and stronger regulations on SOx emissions are forecast to be enforced in 2020. In particular, the tougher regulations on SOx emissions will lead shipping companies to change fuel into LNG, install scrubbers, or use low sulfur oil fuel. In any case, they can't avoid paying higher costs, causing industry experts to pay keen attention to and discuss what the companies will choose and how they will raise necessary funds.

As of 2014, the gross output of the shipping industry was valued at KRW 30.506 trillion, down 20.3% from 2010, with the value added reaching KRW 4.580 trillion, down 14.4% from 2010. However, employees/workers numbered about 70,279, up 17.6% from 2010.

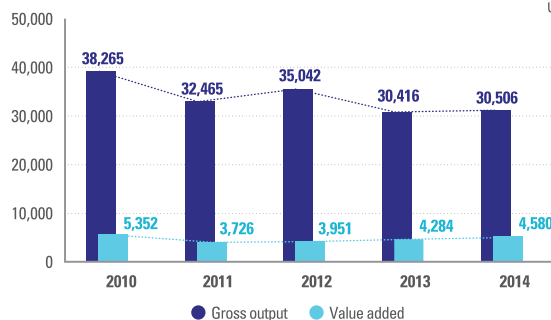
Table 6 Output and value added in the shipping industry

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	38,265	32,465	35,042	30,416	30,506	-20.3
Value added	5,352	3,726	3,951	4,284	4,580	-14.4
Number of employees	59.8	59.9	70.7	72.7	70.3	17.6

Figure 6 Output and value added in the shipping industry

Unit: KRW 1 billion



(3) Port industry

- *Korea's exported and imported freight amounted to 422.26 million tons and 820.33 million tons, respectively while local coastal freight amounted to 133.44 million tons in 2016.*
- *Korea's Busan Port is a hub for trans-shipment in Northeast Asia where freight from northern China, north of Shanghai, and from west of Japan is trans-shipped.*
- *Excessive competition in the loading and unloading industry has emerged as an important issue.*
- *The promotion of Busan New Port has caused a significant amount of traffic to move from the North Port to the New Port, leading the redevelopment of the North Port to emerge as a pending issue.*
- *As of 2014, the gross output of the port industry was valued at KRW 5.0 trillion, with the value added reaching KRW 2.0 trillion.*

The port industry is classified into port transportation and support services offering logistics services at ports and other port-related business providing a variety of related services. In particular, port loading and unloading closely relate to exported and imported freight and local coastal water freight, playing a key role in national logistics systems.

Port storage and warehousing offer freight storage services at ports while freight inspection, survey, and metage services are responsible for calculating the quantity of freight, checking the delivery and receipt of freight, and calculating the weight of freight in the process of handling freight at ports. Freight packing offers freight packaging services while port and other marine terminal operation provides terminal services. The supply of articles for ships is in charge of offering food, consumables, and spare parts to incoming vessels. Port security systems are responsible for keeping ports safe. Other marine transportation support services are in charge of offering piloting services, cargo fixing services, line handling services, and so forth.

Port transportation and support services	Other port business
▪ Port storage and warehousing ▪ Port loading and unloading ▪ Freight inspection, survey, and metage services	▪ Freight packing ▪ Port and other marine terminal operation ▪ Supply of articles for ships ▪ Port security services ▪ Other marine transportation support services

Korea's port traffic in 2016 is as follows: exported and imported freight amounted to 422.26 million tons and 820.33 million tons, respectively while local coastal freight amounted to 133.44 million tons. According to the transportation survey conducted by Statistics Korea, port loading and unloading companies and their employees across the nation totaled 184 and 14,610, respectively in 2016, with sales amounting to KRW 2.9778 trillion.

Korea's Busan Port is a hub for trans-shipment in Northeast Asia where freight from northern China, north of Shanghai, and from west of Japan is trans-shipped. The container throughput at Busan Port amounted to 19.45 million TEUs in 2016, of which trans-shipment accounted for 50.5% (9.83 million TEUs). Gwangyang Port handled 2.25 million TEUs in the same year, functioning as a key logistics port for exporting and importing cargoes along with the Port of Busan. The same year, Incheon Port dealt with 2.68 million TEUs, developing into Korea's number two container port outperforming Gwangyang Port in terms of container throughput, as a result of the growth of trade with China.

Korea's port industry has been faced with various issues. First, as a result of a port being recognized as a logistics interface including logistics activities in its hinterland, rather than a place for simple loading and unloading, the promotion of a port hinterland has been highlighted as a key issue. In particular, the automation of unloading and logistics warehousing has led port authorities to make more efforts to create jobs and income via value-added logistics activities. Second, Korea's ports have more loading and unloading companies than their competitors such as Singapore and Hong Kong. In other words, excessive competition in the loading and unloading industry has emerged as an important issue. In particular, Busan New Port and North Port have seen their loading and unloading companies bear higher financial

burdens due to a drop in service charge resulting from excessive competition.

Third, the promotion of Busan New Port has caused a significant amount of traffic to move from the North Port to the New Port, leading the redevelopment of the North Port to emerge as a pending issue. Fourth, the automation of loading and unloading processes has made HR (human resources) restructuring emerge as another significant issue. In particular, human resources for loading and unloading have been supplied by port and transport unions but automation has made it difficult for port authorities to reach a deal with the unions.

As of 2014, the gross output of the port industry was valued at KRW 4.976 trillion, up 24.5% from 2010, with the value added reaching KRW 1.984 trillion, up 26.5% from 2010.

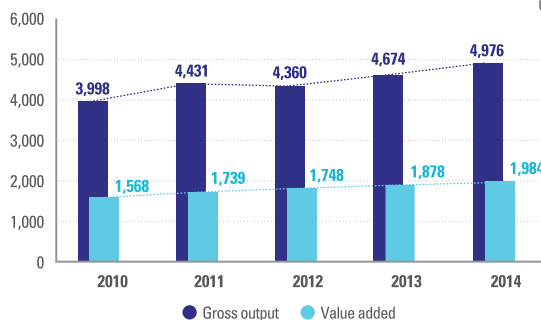
Table 7 Output and value added in the port industry

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	3,998	4,431	4,360	4,674	4,976	24.5
Value added	1,568	1,739	1,748	1,878	1,984	26.5
Number of employees	23.5	24.9	24.7	28.2	27.5	16.8

Figure 7 Output and value added in the port industry

Unit: KRW 1 billion



(4) Vessel and offshore plant construction and repair

- *Korea's vessel and offshore plant construction and repair industry has taken the lead in developing global vessel and offshore plant construction and repair industries based on the world's best competitiveness.*
- *The vessel and offshore plant construction and repair industry acts as an upstream industry for shipping and fisheries industries but at the same time have big effects on downstream industries such as steel, mechanical etc.*
- *Korea's shipbuilding industry has experienced a slump since the global financial crisis but hit the bottom in 2016*
- *The gross output of the vessel and offshore plant construction industry was valued at KRW 64.2 trillion, with the value added reaching KRW 12.0 trillion in 2014.*

Vessel and offshore plant construction and repair is a knowledge-intensive key industry in charge of designing and building a variety of ships and offshore plants that are used for the shipping industry, marine development/resources production, fisheries, marine leisure/tourism, and the military industry. Korea's vessel and offshore plant construction and repair industry has taken the lead in developing global vessel and offshore plant construction and repair industries based on the world's best competitiveness. According to Clarksons Research, the UK's provider of intelligence for global shipping, Korean shipbuilders won new orders amounting to 6.45 million CGT among global orders reaching 23.22 million CGT in 2017, taking second place after China receiving orders amounting to 9.19 million CGT. The new orders received by Korea are valued at US\$ 15.3 billion, slightly less than China's new orders valued at US\$ 15.5 billion.

Vessel and offshore plant construction and repair can be classified into 'ship-building and repair,' 'offshore plant and platform construction and repair,' and 'ship and offshore plant component manufacturing.' First, ship building and repair is defined as industrial activities for building and repairing a variety of vessels including cargo and passenger ships, fishing boats, leisure and sports ships, and special purpose ships (medical/firefighting/security vessels). Offshore plant and platform construction and repair refer to industrial activities for building and repairing offshore oil and gas production plants, diverse offshore platforms, and other stationary ships. Lastly, ship and offshore plant component manufacturing is defined as industrial activities for manufacturing components for various ships, offshore plants, and platforms.

The vessel and offshore plant construction and repair industry has the following characteristics. First, it acts as an upstream industry for shipping and fisheries industries that need vessels but at the

same time have big effects on downstream industries such as steel, mechanical, electric, electronics, and chemical industries. Second, it needs advanced IT technologies, as well as design, production, and management technologies, creating many jobs because it should employ an appropriate number of workers due to limitations in automation in the process of manufacturing diverse big-sized structures. Third, it is a capital-intensive industry that requires large-sized production facilities such as berths, docks, and cranes. Fourth, exporting high-priced ships makes big contributions to increasing exports, earning substantial foreign currency revenues, and improving the national trade balance. And fifth, in terms of national defense, it is deemed to be a very important industry. As a result, regardless of market competitiveness, many nations have maintained and developed the industry.

On the other hand, Korea's shipbuilding industry has experienced a slump since the global financial crisis but hit the bottom in 2016 and has seen the amount of new orders and new building prices gradually jump again. However, due to lack of new orders affecting the industry one or two years later, the shipbuilding industry has failed to recover as fast as expected. According to Korea Offshore and Shipbuilding Association, the tonnage of newly built ships in 2018 is expected to be as small as 7.80 million CGT, about half the past 10-year average of 14 million CGT, with the new building price being also 33% lower than the record high posted in 2008.

Ship building and repair	Ship and offshore plant component manufacturing
▪ Cargo ship building and repair ▪ Fishing boat building and repair ▪ Other ship building and repair	▪ Cargo ship component manufacturing ▪ Fishing boat component manufacturing ▪ Other ship component manufacturing ▪ Offshore plant and platform component manufacturing
Offshore plant and platform construction and repair	

As of 2014, the gross output of the vessel and offshore plant construction industry was valued at KRW 64.236 trillion, down 3.4% from 2010, with the value added reaching KRW 12.048 trillion, down 32.7% from 2010. Employees/workers numbered about 131,400.

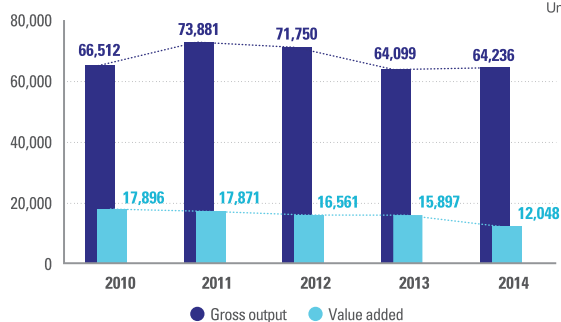
Table 8 Output and value added in the vessel and offshore plant construction and repair

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	66,512	73,881	71,750	64,099	64,236	-3.4
Value added	17,896	17,871	16,561	15,897	12,048	-32.7
Number of employees	120.3	131.3	118.8	125.9	131.4	9.2

Figure 8 Output and value added in the vessel and offshore plant construction and repair

Unit: KRW 1 billion



(5) Marine and fisheries equipment manufacturing

- *The characteristic of marine and fisheries equipment is a high value-added sphere because apparatus can not be easily standardized and is produced in small quantity through customization after receiving orders.*
- *As of 2014, the gross output of the marine equipment manufacturing industry was valued at KRW 5.4 trillion, with the value added reaching KRW 1.4 trillion.*

The marine and fisheries equipment manufacturing industry specializes in producing devices and apparatus for marine activities and includes designing and manufacturing various equipment for ships and offshore plants such as power/propulsion systems, auxiliary machinery, navigation/communications systems, mooring/loading/unloading devices, dwelling/safety equipment, etc. The production, export, and import of marine and fisheries equipment have recently expanded, with its relationship with the vessel and offshore plant construction and repair industry gradually shifting from a vertical to horizontal one.

The marine and fisheries equipment manufacturing industry mainly consists of marine equipment manufacturing and fisheries equipment manufacturing. The former relates to manufacturing devices and equipment for vessels (radio for navigation, machinery for decks, marine pollution prevention apparatus, etc.), drilling devices, equipment for offshore plants (oil and gas processing facilities, mooring systems, etc.), marine leisure and sports equipment (surfboards, scuba gear, and so forth), and other systems for marine resources exploration/development, marine research/analyses, and marine environmental cleanup/remediation. On the other hand, the latter specializes in manufacturing and producing fishing devices (wires, ropes, nets, etc.), aquaculture tools/materials/feeds, fisheries product processing systems, and leisure fishing gear/bait.

Diverse equipment mounted on vessels account for 55~65% of ship construction costs and have been widely known to belong to a high value-added sphere. The characteristics of marine and fisheries equipment are as follows: First, because vessels vary in shape and type and required equipment per vessel is limited, apparatus can not be easily standardized and is produced in small quantity through customization after receiving orders. Second,

because orders for equipment are placed (after a certain period of time) following winning contracts for ship-building, they should be manufactured and supplied within a relatively short period of time. Third, when signing a contract for ship-building, clients tend to request ship builders to use functionally important equipment produced by specific manufacturers. Therefore, it is difficult to create markets for newly developed devices and apparatus. Product quality should be very strictly controlled because various international standards should be met in durability, corrosion resistance, and safety.

Marine equipment manufacturing	Fisheries equipment manufacturing
▪ Ship-related equipment manufacturing ▪ Offshore plant-related equipment manufacturing ▪ Marine leisure and sports equipment manufacturing ▪ Other marine equipment manufacturing	▪ Fishing equipment manufacturing ▪ Aquaculture equipment manufacturing ▪ Fisheries processing equipment manufacturing ▪ Leisure fishing equipment manufacturing

As of 2014, the gross output of the marine equipment manufacturing industry was valued at KRW 5.405 trillion, up 21.7% from 2010, with the value added reaching KRW 1.442 trillion, up 24.7% from 2010. Employees/workers numbered 18,701, up 17.3% from 2010.

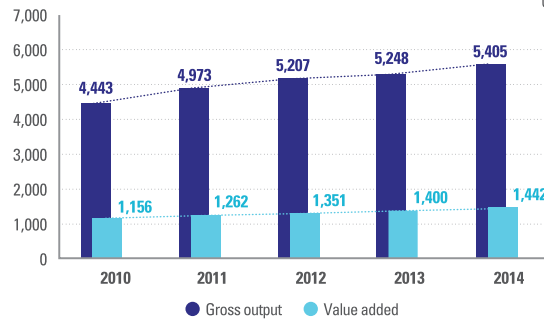
Table 9 Output and value added in marine and fisheries equipment manufacturing

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	4,443	4,973	5,207	5,248	5,405	21.7
Value added	1,156	1,262	1,351	1,400	1,442	24.7
Number of employees	15.9	16.9	16.9	17.8	18.7	17.3

Figure 9 Output and value added in marine and fisheries equipment manufacturing

Unit: KRW 1 billion



(6) Marine resources development/construction

- *The gross output of the marine resources development industry was valued at KRW 2.6 trillion and total value added is KRW 1.2 trillion in 2014.*

Marine resources development

Korea has collected aggregates such as sand, gravel, etc. from the ocean and coastal areas, exploring for oil and natural gas in the ocean. It has also manufactured a variety of products such as mineral water, beverages, cosmetics, and so forth by using deep sea water. Korea's marine renewable energy industry has produced electricity by using tidal currents, tidal energy, wave power, offshore wind power, and offshore solar energy or developed the air-conditioning and heating industry by using seawater temperature differences. Korea's marine bio-industry has provided various products and services including marine bio-foods, medicine, and chemical products (cosmetics) by using marine bio-technologies based on marine bio-resources. The main ingredients of marine bio-products are fish and seaweeds. According to the marine bio-research conducted in 2016 by the Ministry of Oceans and Fisheries, Korea's marine bio-industry was valued at KRW 536.9 billion, employing 2,968 workers, and accounting for 6% and 7% of Korea's bio-industry as a whole in sales and employment, respectively.

Marine construction

Korea's marine construction industry includes constructing and maintaining ports, building structures for the preservation of coastlines (offshore maintenance projects), reclaiming land from the sea, and installing offshore plants, as well as constructing bridges and establishing submarine cables.

Marine resources development	Marine construction
▪ Marine mineral resources mining ▪ Seawater processing and supply ▪ Marine renewable energy development ▪ Marine bio-products manufacturing	▪ Port and sea-crossing bridge construction ▪ Marine and fisheries plant and structure construction

As of 2014, the gross output of the marine resources development industry was valued at KRW 2.589 trillion, accounting for 1.8% of that of the marine and fisheries industries valued at KRW 147.400 trillion; with the value added taking up 3.1% of that of the marine and fisheries industries estimated at KRW 38.895 trillion.

The gross output of the marine resources development industry dropped by 29.3% from KRW 3.660 trillion in 2010 to KRW 2.589 trillion in 2014, with the total value added declining by 17.5% from KRW 1.473 trillion to KRW 1.215 trillion during the same period of time. The number of employees/workers fell by 8.9% from 15,078 in 2010 to 13,739 in 2014. These results are deemed to be attributed to the weak performance of the marine construction sector whose share is deemed to be significant.

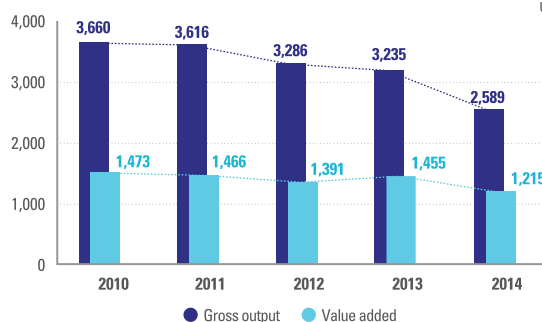
Table 10 Output and value added in marine resources development and construction

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	3,660	3,616	3,286	3,235	2,589	-29.3
Value added	1,473	1,466	1,391	1,455	1,215	-17.5
Number of employees	15.1	18.7	18.7	16.8	13.7	-8.9

Figure 10 Output and value added in marine and fisheries equipment manufacturing

Unit: KRW 1 billion



(7) Marine leisure and tourism

- *Korea is surrounded by water on its three sides and has a wealth of marine leisure and tourism resources.*
- *As of 2014, the gross output of the marine leisure and tourism industry was valued at KRW 1,223billion, and added-value is 407billion.*
- *The marine leisure and tourism is an industry with high potential for growth in value added and output, although its output and value-added ratio are small compared to the marine fisheries sector as a whole.*

Korea is surrounded by water on its three sides and its coastline is as long as 14,963km. Also, it has a wealth of marine leisure and tourism resources including more than 60 ports and a total of 109 national harbors. Korea's Coast, 2015, Ministry of Oceans and Fisheries* Marine leisure and tourism consists of the Marina industry, the cruise industry, sea bathing tourism, recreational fishing and so forth.** As of 2013, Korea operated more than 30 Marina ports and has actively developed the ports with the aim of establishing 46 ports by 2019.*** There are 358 beaches across the nation, with visitors numbering about 100 million a year as of 2015, up 43.5% from the previous year.****

The recreational fishing industry, which is a representative fisheries leisure tourism sector, has seen its sales and the numbers of fishing boats and people enjoying fishing jump significantly.***** The number of leisure fishing boat users climbed by 52.6% from 2.248 million in 2010 to 3.429 million in 2016.

Marine leisure and tourism refer to tourism activities that are implemented in communities adjacent to the seas and coast and that directly or indirectly rely on or relate to marine spaces.***** Marine tourism and leisure mean the industry where humans carry out all kinds of activities in the ocean for the purposes of tourism and leisure including recreation, entertainment, and education, and relate to manufacturing, facilities, services, etc.

* Korea's Coast, 2015, Ministry of Oceans and Fisheries

** 2nd Basic Plan for the Promotion of Marine Tourism, 2014, Ministry of Oceans and Fisheries

*** Korea's Marina Port Facility Guide, 2013, Homepage of the Ministry of Oceans and Fisheries

**** "Beach visitors numbered 100 million in 2015, up 45.3% from a year earlier," Sept. 24, 2015, Press Release by the Ministry of Oceans and Fisheries

***** "The leisure fishing industry grew remarkably, with the numbers of fishing boats and people enjoying fishing, as well as its sales, jumping," May 26, 2017, Press Release by the Ministry of Oceans and Fisheries

***** "Research on the Socio-Economic Effects of Marine Leisure Tourism and the Development of Related Indicators," 2015, Korea Maritime Institute

The industry includes tourism activities that are carried out in the ocean and coastal areas for leisure, sports, health, rest, and emotional cultivation, and related sectors.* In terms of space, it refers to tourism activities that are enforced in coastal regions where the sphere of living forms through or being affected by the ocean. In the context of activities, it signifies tourism activities that directly or indirectly use the ocean or relate thereto. In other words, marine leisure and tourism can be defined as all tourism activities that are conducted in coastal areas including the seaside and spaces in and on the sea.**

Marine leisure and tourism	Fisheries leisure and tourism
▪ Marine leisure facility operation ▪ Marine tourism facility operation	▪ Fishing tourism ▪ Other fisheries leisure tourism

As of 2014, the gross output of the marine leisure and tourism industry was valued at KRW 1,223 billion, accounting for 0.8% of that of the whole marine and fisheries industries, which is valued at KRW 407 billion, with the value added, the industry takes up 1.0% of that of the whole marine and fisheries industries.

Table 11 Output and value added in Marine Leisure and Tourism

Unit: KRW 1 billion, 1,000 persons, %

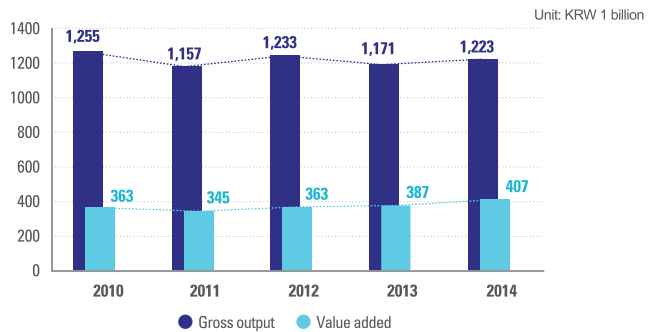
	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	1,255	1,157	1,233	1,171	1,223	-2.5
Value added	363	345	363	387	407	12.3
Number of employees	9.6	9.9	10.4	10.7	11.0	14.3

* "Research on Projects for Promoting the Development of Saemangeum Marine Leisure," 2016, Saemangeum Development and Investment Agency

** "Research on the Socio-Economic Effects of Marine Leisure Tourism and the Development of Related Indicators," 2015, Korea Maritime Institute

The marine leisure and tourism is an industry with high potential for growth in value added and output although its output and value-added ratio are small compared to the marine fisheries sector as a whole. The gross output of the marine leisure and tourism industry dropped by 2.5% from KRW 1,255 billion in 2010 to KRW 1,223 billion in 2014, with the total value added jumping by 12.3% from KRW 363 billion to KRW 407 billion during the same period of time. The number of employees/workers swelled by 14.3% from 9,609 in 2010 to 10,985 in 2014.

Figure 11 Output and value added in Marine Leisure and Tourism



(8) Marine and fisheries services

- *The marine and fisheries services industry has a great potential for growth and is able to create high value-added via convergence with traditional marine and fisheries industries*
- *The gross output of the marine and fisheries services industry was valued at KRW 16.4 trillion and total value added is KRW 10.5 trillion in 2014.*

With the expansion of the share of knowledge and technology-related services in the knowledge-based economy, the roles of marine and fisheries services have become more important. The marine and fisheries services industry has a great potential for growth and is able to create high value-added via convergence with traditional marine and fisheries industries including fisheries, shipping, and ship-building.

The marine and fisheries services industry consists of 'marine waste processing, cleanup, and recovery,' 'marine and fisheries equipment wholesale and retail,' 'marine and fisheries equipment repair,' 'marine and fisheries HR employment and supply services,' 'marine and fisheries education services,' 'marine and fisheries science and technology services,' 'marine and fisheries finance and insurance,' 'marine and fisheries associations and organizations,' and 'fish and seafood restaurants.' This industry specializes in offering professional marine and fisheries services in the areas of environment, information, science/technology, finance, insurance, laws, accounting, management consulting, lease, and distribution, as well as including the activities of public organizations such as institutions, associations, and so forth that deliver public services such as education, research, and so on.

As of 2014, the gross output of the industry was valued at KRW 16.384 trillion, accounting for about 11.1% of that of the marine and fisheries industries as a whole with an estimated value of KRW 147.0 trillion. Its value added took up about 27.0% of that of the marine and fisheries industries as a whole estimated at KRW 38.9 trillion. Its gross output climbed by 32.7% from KRW 12.351 trillion in 2010 to KRW 16.384 trillion in 2014. Its value added has also consistently grown, with the value for 2014 jumping by 30.2% from the year 2010. The number of employees/workers rose from 151.7 thousand in 2010 to 172.1 thousand in 2014.

Marine wastes processing, cleanup, and recovery	Marine and fisheries science and technology services
Marine and fisheries equipment wholesale and retail	Marine and fisheries finance and insurance
Marine and fisheries equipment repair	Marine and fisheries associations and organizations
Marine and fisheries HR employment and supply services	Fish and seafood restaurants
Marine and fisheries education services	

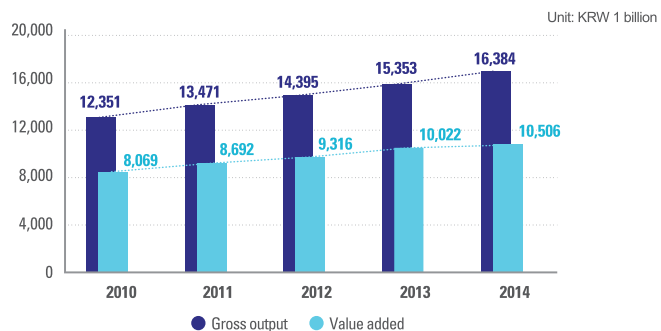
Table 12 Output and value added in marine and fisheries services

Unit: KRW 1 billion, 1,000 persons, %

	2010 (A)	2011	2012	2013	2014 (B)	(B-A)/A
Gross output	12,351	13,471	14,395	15,353	16,384	32.7
Value added	8,069	8,692	9,316	10,022	10,506	30.2
Number of employees	151.7	157.3	164.4	168.7	172.1	13.5

The gross output and value added in marine and fisheries services have continuously grown, with the gross output rising more sharply than the value added. The gross output grew by 32.7% from KRW 12,351 trillion in 2010 to KRW 16,384 trillion in 2014 while the value added jumped by 30.2% from KRW 8,069 trillion in 2010 to KRW 10,506 trillion in 2014. The number of employees/workers climbed by 13.5% from 151,650 in 2010 to 172,071 in 2014.

Figure 12 Gross output and value added in marine and fisheries services



4 Conclusion

- *The ocean and fisheries industries have shown different development patterns in accordance with environment, resources, and technological elements.*
- *Korea's ocean and fisheries industries have grown, relying on the ship-building industry, in terms of quantity.*
- *Now is the time for Korea's ocean and fisheries industries to seek new opportunities.*
- *The industrial structure should be reorganized to lessen the high dependence of the marine and fisheries industries on global economy, promoting new industries that can expand export, based on stable domestic consumption.*

Based on the fisheries industries belonging to the primary industry and offering seafood to Korean people, Korea's ocean and fisheries industries have consistently grown, along with the development of shipping, port, and ship-building industries. Korea's long coastline has led to the development of the marine leisure and tourism industry and the nation has recently experienced the growth of new industries including 'marine environmental restoration,' 'marine resources development,' 'marine biotechnologies,' 'marine and fisheries science and technology,' and 'marine finance.'

The ocean and fisheries industries have shown different development patterns in accordance with environment, resources, and technological elements. As mentioned earlier, Korea's ocean and fisheries industries have grown, relying on the ship-building industry, in terms of quantity. However, with the year 2020 being around the corner, the world's ocean economy is witnessing the issue of environment shifting from an external to internal economic variable. As new state-of-the-art technologies for digitization, unmanned solutions, and automation apply to the spheres of shipping, port, logistics, and aquaculture, many experts in the world have higher expectations of future marine and fisheries industries from future ocean and fisheries industries. Now is the time for Korea's ocean and fisheries industries to seek new opportunities.

The Korean Ministry of Oceans and Fisheries aims to increase the proportion of direct and indirect contributions of the marine and fisheries industries to GDP to 10% by 2030. To this end, the industrial structure should be reorganized to lessen the high dependence of the marine and fisheries industries on global economy, at the same time promoting new industries that can

expand export, based on stable domestic consumption.

Based on the objective diagnosis of the past and present of the ocean economy, the future should be studied and come up with industrial policies for the development of Korea's ocean economy. Under this background, the KMI's Ocean Economy Research Division will continuously diagnose and analyze the future of Korea's ocean economy and based on this, publish an annual report on 'Korea's Ocean Economy.'

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Appendix

1 2018 Classification of Korea's Ocean and Fisheries Industries

High-level classification	Mid-level classification	Low-level classification
Fisheries production	Fishing	Marine fishing
		Freshwater fishing
	Aquaculture	Marine aquaculture
		Inland aquaculture
		Aquarium fish and seaweed culture
	Services incidental to fishing and aquaculture	Services incidental to fishing and aquaculture
Salt collection	Salt collection	
Fisheries processing	Fisheries processing	Aquatic animal processing and storage
		Seaweed processing and storage
		Salt processing
		Other fisheries processing
Fisheries distribution	Fisheries brokering and wholesale/retail	Fisheries brokerage
		Fisheries wholesale/retail
		Aquarium fish and seaweed wholesale/retail
	Fisheries transportation and storage	Fisheries transportation
		Cold storage warehouse for fisheries
Shipping and port industries	Shipping industry	Passenger transportation
		Freight transportation
		Other shipping services
	Port industry	Port transportation support services
		Other port business
Vessel and offshore plant construction and repair	Ship building and repair	Cargo ship building and repair
		Fishing boat building and repair
		Other ship building and repair
	Offshore plant and platform construction and repair	Offshore plant and platform construction and repair
	Ship and offshore plant component manufacturing	Cargo ship component manufacturing
		Fishing boat component manufacturing
		Other ship component manufacturing
Offshore plant and platform component manufacturing		
Marine and fisheries equipment manufacturing	Marine equipment manufacturing	Ship-related equipment manufacturing
		Offshore plant-related equipment manufacturing
		Marine leisure and sports equipment manufacturing
		Other marine equipment manufacturing
	Fisheries equipment manufacturing	Fishing equipment manufacturing

High-level classification	Mid-level classification	Low-level classification
Marine and fisheries equipment manufacturing	Fisheries equipment manufacturing	Aquaculture equipment manufacturing
		Fisheries processing equipment manufacturing
		Leisure fishing equipment manufacturing
Marine resources development/construction	Marine resources production, supply, and development	Marine mineral resources mining
		Seawater processing and supply
		Marine renewable energy development
		Marine bio-products manufacturing
	Marine bio-products manufacturing	Marine bio-products manufacturing
	Port and sea-crossing bridge construction	Port construction
		Sea-crossing bridge construction
	Marine and fisheries plant and structure construction	Marine plant and structure construction
		Aquaculture facility and artificial reef installation and construction
Marine and fisheries leisure and tourism	Marine leisure and tourism	Marine leisure facility operation
		Marine tourism facility operation
	Fisheries leisure and tourism	Fishing tourism
		Other fisheries leisure tourism
Marine and fisheries services	Marine waste processing, cleanup, and recovery	Marine waste processing, cleanup, and recovery
	Marine and fisheries equipment wholesale and retail	Marine leisure and sports equipment wholesale and retail
		Offshore plant and other equipment wholesale and retail
		Leisure fishing equipment wholesale and retail
		Ship, vessel components, and related equipment brokerage, wholesale, and retail
	Marine and fisheries equipment repair	Fishing and aquaculture equipment wholesale and retail
		Fisheries processing machine wholesale
		Marine equipment repair
		Fisheries equipment repair
	Marine and fisheries HR employment and supply services	Marine and fisheries HR employment and supply services
	Marine and fisheries education services	Marine and fisheries education services
	Marine and fisheries science and technology services	Marine science and technology services
		Fisheries science and technology services
		Marine R&D
		Fisheries R&D
		Marine and fisheries publishing and information system development
	Marine and fisheries finance and insurance	Marine and fisheries finance and insurance
	Marine and fisheries associations and organizations	Marine and fisheries associations and organizations
	Fish and seafood restaurants	Fish and seafood restaurants

2 Output, value added, and employment of the marine and fisheries industries (US\$)

Industries	Output (USD millions)	Value added (USD millions)	Employment
Marine resources development/ construction	2,458.0	1,153.4	13,739
Shipping industry	28,963.5	4,348.4	70,279
Port industry	4,724.5	1,883.9	27,494
Vessel and offshore plant construction and repair	60,987.4	11,438.6	131,418
Fisheries production	7,211.2	2,946.5	44,990
Fisheries processing	8,966.1	1,248.8	40,655
Fisheries distribution	4,454.5	2,195.4	65,827
Marine leisure and tourism	1,161.4	386.9	10,985
Marine and fisheries equipment manufacturing	5,131.9	1,368.9	18,701
Marine fisheries services	15,555.1	9,975.0	172,071
Total (ocean and fisheries industries)	139,613.7	36,945.7	596,160

Note: USD 1 = KRW 1,053.26 in 2014

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