



Sa
TESDA,
Lingap
ay Maaasahan

Labor Market Intelligence | OCTOBER
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Building Vessels, Refurbishing Careers: Labor Market Intelligence in Shipbuilding and Repair

The Philippine Maritime Industry

I. Executive Summary

The Philippines, being an archipelagic country, has an edge in the maritime industry. Being hailed as the top supplier of seafarers globally, it now also ranks 4th since 2010 after China, South Korea, and Japan respectively.

Furthermore, the aforementioned countries are also experiencing a continued decrease in their population, thus making them opt to open their doors to foreign workers to fill the gaps in their workforce. Hence, the Philippines is in the position to capitalize on the opportunities presented by further strengthening our position as the go to nation for suppliers of labor. Consequently, it contributes \$500 million USD (24 billion PHP) in taxes alone and an additional \$2.4 billion (116 billion PHP) in cumulative investments while also employing 46,000 workers.

Having said that, the government wants to capitalize on this fact by establishing a global maritime shipping hub in the nation; in doing so hopes to put the country into a better position to leverage the huge swaths of trade along our waters.

In regards to this, MARINA has laid the groundwork in their Maritime Industry Development Plan (MIDP) to which allied government agencies will utilize to discern and enact their corresponding roles. To which, TESDA has been tasked in increasing the number of welders and fitters by 25% year-on-year; and developing new education and training standards rooted on professional, skills or expertise programs together with MARINA and CHED.

In accordance with these tasks, TESDA has actively improved industry participation to aid in its development of programs with the appropriate sectors through industry consultations and surveys. Moreover, it is also looking into the integration of expanded reality (XR) technology in its programs (particularly welding) to expedite its production of certified welders by shortening the nominal hours for training. Hence, increasing the number of batches a training school and assessment centers can accommodate.

II. Background

a. History

It is general knowledge that 70 percent of the world is covered in water. From the twin rivers of Tigris and Euphrates in ancient Mesopotamia; to the age of discovery of the Europeans of the west, to the spice trades in the east, be it for trade or transportation, we have long sought to conquer the waves. As such the ways of the sea have long been ingrained into human society ever since.

The Philippines especially is no exception to this. Being an archipelagic country of over 7,600 islands, its citizens are quite accustomed to the ways of the sea. This fact is made more evident considering that remnants of their seafaring ancestry can still be seen in their modern society. An example of which would be their smallest government unit, the barangay whose origins stem from the word *balangay*; a small wooden boat used by our ancestors.

Having said that, the Philippines' rise to prominence in the maritime stage can be first traced back to the 1970's during the oil crises. This is due to the rising costs of western crews (dataSpring Editors, 2021); which then marked the beginning of the Filipino Seafarer onto the global stage.

b. Current Situation

The Philippines today is known globally for its contributions towards the Maritime Industry; whether it be from supplying seafarers where it ranks 1st as according to the United Nations Conference on Trade and Development (UNCTAD, see figure 2.1.1); or its prowess in the SBSR industry where it ranks 5th by exported tonnage, and 4th by gross tonnage according to (Aboitiz InfraCapital, 2022).

MARINA states that, it is an indisputable fact that Filipino seafarers are the most ubiquitous among the country's maritime workforce as the Philippines remains one of the main suppliers (see figure 2.1.1) of maritime labor in the world. It is also estimated that there is one Filipino seafarer for every four to five crew members (1:4 or 1:5) on board a vessel at any time. Based on *figure 2.1.2*, there was a total of 3.6 million recorded for deployment for sea-based overseas Filipino workers between 2011-2020.

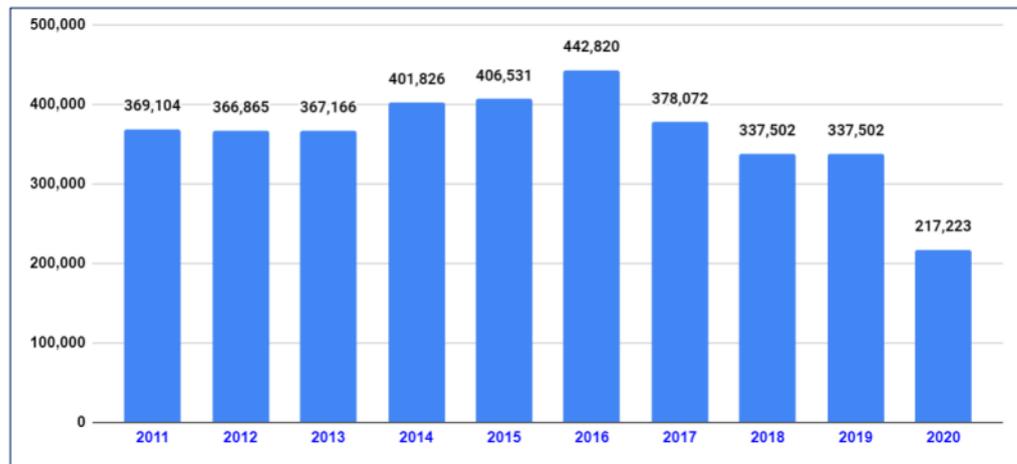
Figure 2.1.1 - Top Seafarer Suppliers

Table 2 Five largest seafarer-supplying countries 2021 supplying countries 2021			
	All Seafarers	Officers	Ratings
1	Philippines	Philippines	Philippines
2	Russian Federation	Russian Federation	Russian Federation
3	Indonesia	China	Indonesia
4	China	India	China
5	India	Indonesia	India

Source: ISF and BIMCO, Seafarer Workforce Report 2021, London, 2021.

Source: unctad.org - Review of Maritime Transport (2021)

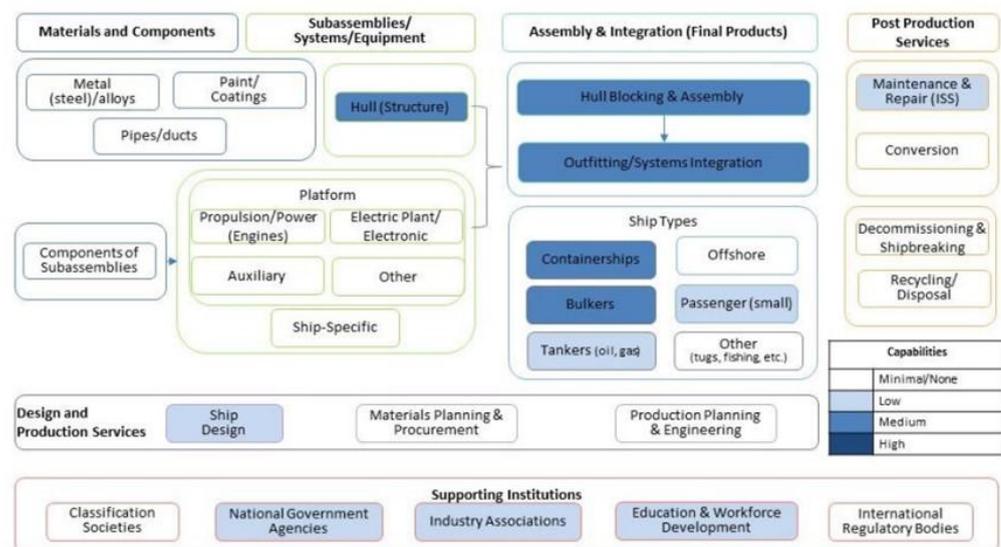
Figure 2.1.2 - Deployed Overseas Filipino Workers (2011 - 2020) (sea-based)



Source: Department of Migrant Workers – POEA⁸

Source: MARINA - Promotion of Highly Skilled and Competitive Filipino Maritime Workforce

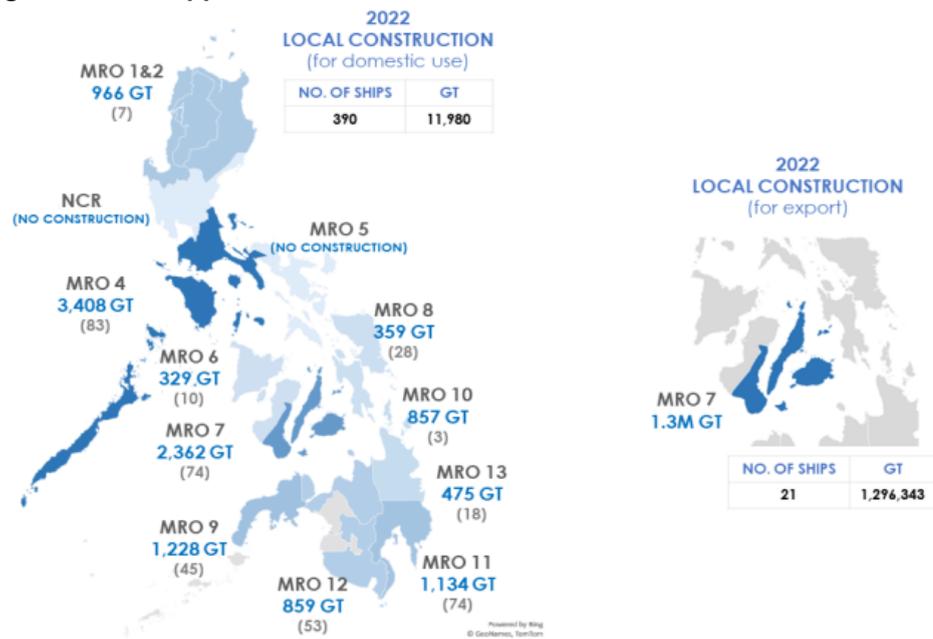
Figure 2.2 - Philippines in the Global Value Chain



Source: (Fredrick and Brun, Duke CGGC, 2017)

Based on figure 2.2, majority of the activities being carried out in the Philippines are segments of subassemblies/systems/equipment (hull - structure), and assembly and integration (hull blocking/assembly and outfitting/systems integration) as well as post production services (maintenance and repair). Figure 2.3 meanwhile shows the SBSR locations within the country. It's highlighted that the different ports primarily engage in domestic and export markets.

Figure 2.3 - Philippine SBSR Locations



Source: MARINA - Philippine SBSR Situation Report 2022

Figure 2.4 - Philippine Maritime Industry Contributions (2015)



Source: *The Impact of the Maritime Industry on the Philippine Economy*

As of 2015, the Philippines has had a significant contribution to the global maritime industry (see figure 2.5). There, it highlights the sectors that have had a significant contribution to the nation's economy; (1) Crewing and Manning, (2) Seafarers Education and Training, (3) Port Operations and Services, (4) International Cargo Vessels and Affiliated Services, (5) Shipbuilding, Shipyards and Engineering, and lastly (6) Tourism Maritime Facilities (Richter, 2016).

According to the United Nations Conference on Trade and Development, maritime transport is the backbone of international trade and the global economy. Over 80% of the volume of international trade in goods is carried by sea, and the percentage is even higher for most developing countries (Review of Maritime Transport 2021, 2021).

Though the share of Philippines' trade is only a small fraction thereof in the global trade, its contribution however to the maritime industry is staggeringly more. The country, according to the Philippine Overseas Employment Administration (POEA), has been the world's largest supplier of sea-based workers since 1987 (see figure X), which makes it the manning capital of the world, and ranks 4th in the world in regards to its shipbuilding and ship repair capabilities (see figure 2.5 and 2.6).

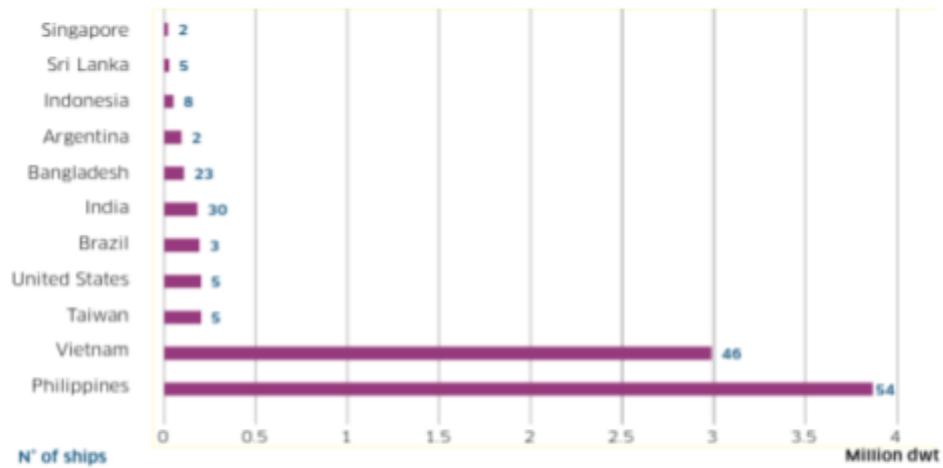
Figure 2.5 - Percentage Share of Shipbuilding Capacity

Orderbook		2021	2022
China	Market Share	47.7%	50.3%
	m dwt	110.1	121.3
	ships	1,708	1,794
Korea	Market Share	29.6%	29.0%
	m dwt	68.3	69.8
	ships	626	734
Japan	Market Share	17.6%	15.1%
	m dwt	40.7	36.5
	ships	612	587
Europe	Market Share	2.4%	2.3%
	m dwt	5.5	5.5
	ships	288	319
ROW	Market Share	2.8%	3.3%
	m dwt	6.4	7.9
	ships	180	188

Source: MARINA - Philippines SBSR Situation Report (2022)

Figure 2.6 - Philippine SBSR (RoW) Situation

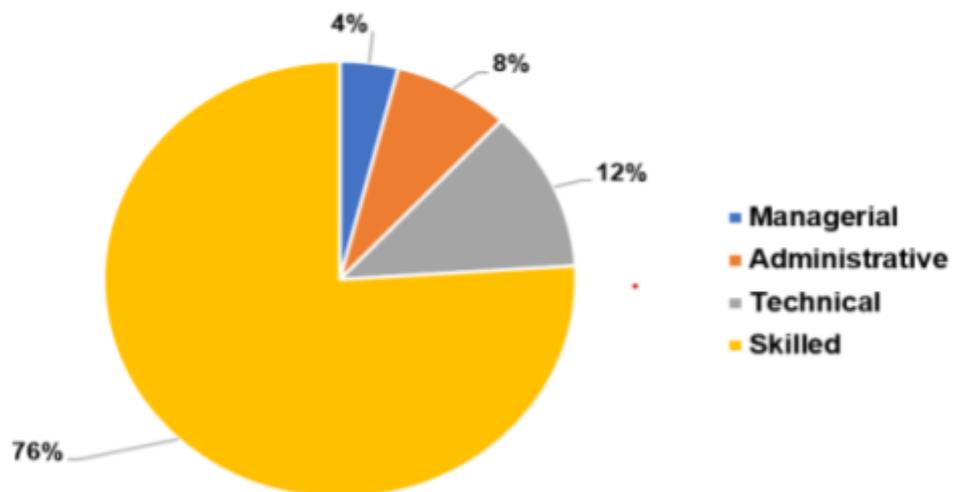
Orderbook in Rest of the World at end-2022 (million dwt)



Source: MARINA - Philippine SBSR Situation Report (2022)

As for the current situation of the SBSR of the Philippines, it can be seen in Figure 2.7 that the skilled workers clearly make up the backbone of the SBSR industry.

Figure 2.7 - % Distribution of SBSR Personnel by Occupational Category



Source: MARINA - Philippine SBSR Situation Report (2022)

Figure 2.8 - Worker's Employment by Categories (Operation, Employment)

CATEGORY OF EMPLOYMENT	CATEGORY OF OPERATIONS											
	SBSR - A		SBSR - B		SBSR - C		AFLOAT SHIP REPAIR		BOAT BUILDER		SHIP BREAKER	
	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020
TECHNICAL												
- Permanent	212	357	226	143	564	443	1303	124	166	76	50	40
- Contractual	6	4	10	7	115	74	13	6	67	60	0	3
SKILLED/SEMI-SKILLED												
- Permanent	1426	1569	1162	540	2834	1316	8696	268	1151	195	271	351
- Contractual	91	25	165	162	875	555	2295	2192	741	293	246	285
ADMINISTRATIVE	248	209	190	138	437	302	786	284	296	83	56	69
MANAGERIAL	154	133	100	47	176	173	222	234	121	40	21	37

Source: MARINA - Statistical Report (2017-2021)

From figure 2.7 and 2.8, it can be ascertained that there is a gap in the number of permanent workers who are skilled/semi-skilled for SBSR - B (see figure 2.9 for SBSR class types). The latter pertains to the capability of building and repairing ships with a maximum length of 129 meters (inland waters).

Figure 2.9 - Number of MARINA-Registered and Licensed Shipyards as of 2022

SBSR Category	Classification	Number	Capacity Limitation
Shipbuilder and Ship Repair (SBSR) under MC No. 2018-02 and MC No. SR-2019-01	Class A	7	Capable of building and repairing big ships with a minimum length of at least 130 meters
	Class B	19	Capable of building and repairing ships with a maximum length of 129 meters
	Class C	98	Capable of building and repairing ships with a maximum length of 80 meters
Total Number of Shipyards:		124	

Source: MARINA - Philippine SBSR Situation Report (2022)

Figure 2.10 - Major Ship Building Projects in the Philippines

	Hanjin	Keppel	Tsuneishi	Herma
Logo				
Capacity	18 Vessels/year 2,489,700 DWT	8 Vessels and 16 tugboats/year (up to 480,000 DWT per facility)	Can build up to 250,000 DWT vessel	6 vessels/year
Location	Subic	Batangas	Cebu	Bataan
Project cost	79.6 billion PHP	1.5 billion PHP	12 billion PHP	215 billion PHP
Employees	19,750	1,520	8,800	290

Figure 2.10 meanwhile showcases the class A shipbuilders that are responsible for ship construction intended for exports.

Furthermore, MARINA also states in their annual SBSR situational report for 2022 that there has been a continued increase in the number of SBSR entities compared to the previous years of 2020 and 2021 with 115 and 116 respectively; with 2022 having an 8% from that of the previous year.

MARINA identifies that the industry is composed of the following sectors: (1) Domestic Shipping Sector; (2) Manpower Development Sector; (3) Shipbuilding and Ship Repair Sector; (4) Overseas Shipping Sector; (5) Franchising Sector.

- 1) Domestic Shipping - is defined as the “transport of passengers or cargo, or both, by ships duly registered and licensed under Philippine law to engage in trade and commerce between Philippine ports and within Philippine territorial or internal waters, for hire or compensation, with general or limited clientele, whether permanent, occasional or incidental, with or without fixed routes, and done for contractual or commercial purposes. (Source: MARINA)
- 2) Manpower Development - this is about the development and maintaining a reservoir of adequately trained, competent and qualified maritime manpower internationally competitive and at par with globally recognized practices and standards to amply provide current and future requirements of the country and of the world.
- 3) Shipbuilding and Ship Repair - “Shipbuilding refers to the design, construction, launching and outfitting of all types of watercraft while Ship Repair refers to the the overhaul, repair, improvement, alteration of the hull, machineries, equipment, outfits, and components of all types of watercraft.” (Source: MARINA)

- 4) Overseas Shipping refers to the utilization of ships overseas, such as international trading, and other related activities. (Source: MARINA)
- 5) Franchising - refers to the exercise of MARINA's quasi-judicial functions over all public water transportation services. (Source: MARINA)

Given its rise and importance, the Philippines has legislated laws to help it further its presence in the maritime industry (see table 2.1).

Table 2.1 - Relevant Laws and Policies

Law/Policy		Description	Provision on Human Resource Development
RA 10635	The MARINA STCW Administration Act of 2014	The Maritime Industry Authority (MARINA) was created on 01 June 1974 as an attached Agency to the Office of the President (OP) with the issuance of Presidential Decree No. 474, otherwise known as the Maritime Industry Decree of 1974, to integrate the development, promotion and regulation of the maritime industry in the country. With the creation of the Ministry (now Department) of Transportation and Communications (DOTC) by virtue of Executive Order No. 546, the MARINA was attached to the DOTC for policy and program coordination on 23 July 1979.	Assume all powers and functions of the Professional Regulation Commission (PRC), the Commission on Higher Education (CHED), the Technical Education and Skills Development Authority (TESDA), the Department of Health (DOH) and the National Telecommunications Commission (NTC) relative to the issuance, validation, verification, correction, revocation or cancellation of certificates of competency, endorsement, proficiency and documentary evidence required of all seafarers and all such other matters pertaining to the implementation of the STCW Convention

RA 9295	An Act Promoting the Development of Philippine Domestic Shipping, Shipbuilding, Ship Repair & Ship Breaking, Ordaining Reforms in Government Policies Towards Shipping in the Philippines and for Other Purposes	The Philippines needs a strong and competitive domestic merchant fleet owned and controlled by Filipinos or by corporations at least sixty percent (60%) of the capital of which is owned by Filipinos and manned by qualified Filipino officers and crew which shall: (a) bridge our islands by ensuring safe, reliable, efficient, adequate and economic passenger and cargo services; (b) encourage the dispersal of industry and the economic development of our regional communities by ensuring the availability of regular, reliable and efficient shipping services; (c) ensure the growth of exports by providing necessary, competitive and economical domestic sea linkage; (d) serve as a naval and military auxiliary in times of war and other national emergencies; and (e) function as an employment support base for our Filipino seafarers.	Though there is no explicit mention on human resource development, Section 2 states that the domestic merchant fleet should be manned by “qualified Filipino officers and crew”, and that “Filipino crew to meet international standards” may imply that there is a need for human resource development so that Filipino officers and crew remain qualified and able to comply with the standards.
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Since its establishment, the MARINA being the authority to integrate the development, promotion and regulation of the maritime industry in the country, has had numerous attempts in trying to reign in the Philippine Maritime Industry towards development. One such example is their Maritime Industry Development Plan for 2019 - 2028 (see figure 2.11).

Figure 2.11 - Maritime Industry Development Plan (2019 - 2028)



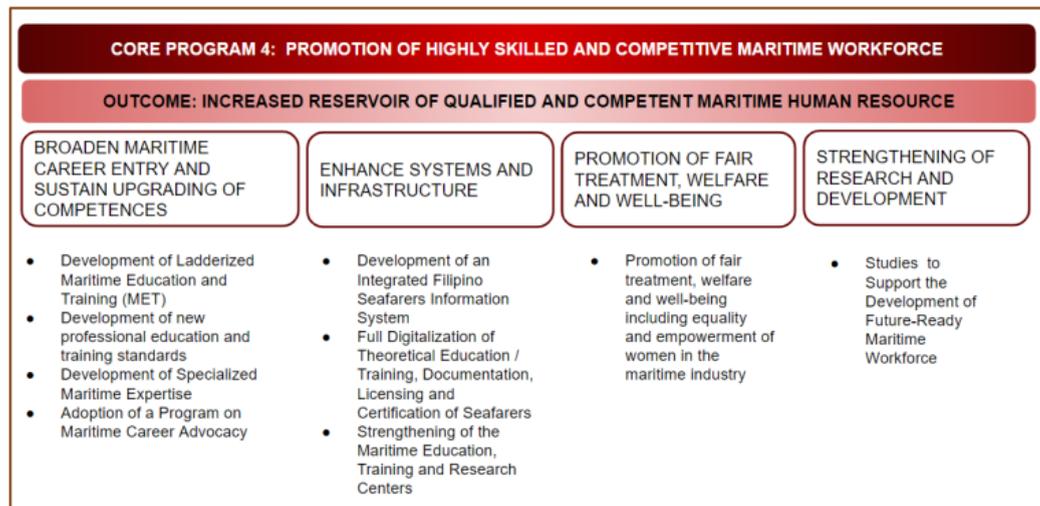
Source: DOTr - MARINA: Maritime Industry Development Plan 2028

As shown in table 2.2, TESDA has been tasked to assist in MARINA's priority programs. But for purposes of this paper, it would primarily revolve around programs 5 (Development of a Global Maritime Hub) and 9 (Development of Competitive and Highly Skilled Filipino Maritime Professionals).

Table 2.2 - MIDP Priority Programs

Program 1	Upgrading of Domestic Shipping in Support of the Philippine Nautical Highway Development
Program 2	Development of Shipping Services for Tourist Destination Areas
Program 3	Development of Coastal and Inland Waterways Transport (CIWT) System
Program 4	Strengthening the Safety Standards of Philippine-Registered Fishing Vessels
Program 5	Development of a Global Maritime Hub
Program 6	Enhancement of Maritime Safety in the Philippines
Program 7	Enhancement of Maritime Transport Security in the Philippines
Program 8	Maritime Innovation and Knowledge Center
Program 9	Development of Competitive and Highly Skilled Filipino Maritime Professionals
Program 10	Implementation of the Philippine Strategy on Maritime Environment Protection

Figure 2.12 - MIDP Core Program 4 - Promotion of Highly Skilled and Competitive Filipino Maritime Workforce



Source: MARINA

Figure 2.13 - MIDP 30-Year Transition Plan

MIDP Program	2019–2030 (National)	2031–2040 (Regional)	2041–2050 (Global)
1. Domestic Shipping	Upgrading of Domestic Shipping in Support of the Integrated Intermodal Transport System	Integration of shipping services in support of ASEAN Connectivity 2025	Continuous Upgrading of Domestic Shipping to ply international routes
2. Maritime Tourism	Development of Shipping Services for Maritime Tourism	Expansion of Cruise Shipping to ASEAN Travel Destinations	Strengthening of Cruise Shipping for International Travel Destinations
3. CIWT	Develop a safe and environmentally-sustainable CIWT that supports an intermodal transport system	Expansion and adoption of CIWT in other metropolitan and rural areas	CIWTS and coastal communities at par with developed countries' standards
4. Fishing Vessels	PFVSR in full effect and implementation	Alignment of Capetown Agreement with local policies	Alignment of Capetown Agreement with local policies
5. Global Maritime Hub	Development of rationalized ships, shipyards and maritime ancillaries	Strengthening of the Global Maritime Hub	Full adoption of SOLAS, MARPOL, STCW, etc to local legislation
6. Maritime Safety	Full implementation and enforcement of the PSSRR	Implementation of ASEAN MOU on Non-convention Vessels	PSSR alignment with international conventions related to maritime safety
7. Maritime Security	Develop on maritime awareness, operations and cooperation	Establish Regional IEC plan of action on maritime security	Establish International IEC plan of action on maritime security
8. Maritime Innovation and Knowledge Center	Establishment of a Maritime Innovation and Knowledge Center	Upgrade the MIKC into a regional center of excellence	Sustaining and refining IT systems in Support of the Priority Programs

Source: MARINA

The MIDP 30-Year Transition Plan in figure 2.13, is explained as follows:

1. Domestic Shipping - the upgrading of domestic shipping in support of the integrated intermodal transport system will be the priority in 2019 - 2030, while the integration of shipping services in support of ASEAN connectivity 2025 will be done in 2031-2040, lastly, the continuous upgrading of domestic shipping to ply international routes will be accomplished in 2031-2050.
2. Maritime Tourism - the following activities will be prioritized with its corresponding target years: (1) Development of Shipping Services for Maritime Tourism (2019 - 2023); (2) Expansion of Cruise Shipping to ASEAN travel destinations (2031 - 2040); and, (3) Strengthening of cruise shipping for international travel destinations (2041 - 2050).
3. CIWT System - the priority for 2019 - 2030 is to develop a safe environmentally-sustainable CIWT that supports an intermodal transport system, while for 2031 - 2040, it is the expansion and adoption of CIWT in other metropolitan and rural areas, lastly, CIWTS and coastal communities at par with developed countries' standards will be the priority for 2041 - 2050.

4. Fishing - we will look at PFVSRR in full effect and implementation in 2010 - 2030 while the alignment of Capetown Agreement with local policies will be the focus on 2031 - 2050.
5. Global Hub - the development of rationalized ships, shipyards, and maritime ancillaries will be the priority for the 1st ten years of the plan, followed by the strengthening of the Global Maritime Hub for 2031 - 2040; and, lastly, full adoption of SOLAS, MARPOL, STCW, etc to local legislation for 2041 - 2050.
6. Maritime Safety, the following activities will be prioritized with their corresponding target years: 1) Full implementation and enforcement of the PSSRR (2019-2030); 2) Implementation of ASEAN MOU on Non-convention Vessels (2031-2040); and, 3) PSSRR alignment with international conventions related to maritime safety (2041-2050).
7. Maritime Security, the sector will Develop policies on maritime awareness, operations and cooperation for 2019-2030, Establish Regional IEC plan of action on maritime security for 2031-2040, and, Establish International IEC plan of action on maritime security for 2041-2050.
8. Under MIKC, the following activities will form part of the 30-Year NTP: 1) Establishment of a Maritime Innovation and Knowledge Center (2019-2030); 2) Upgrade the MIKC into a regional center of excellence (2031-2040); and, 3) Sustaining and refining IT Systems in Support of the Priority Programs (2041-2050)

According to the MIDP's 30 year Transition Plan, (1) Domestic Shipping, the Upgrading of Domestic Shipping in Support of the Integrated Intermodal Transport System will be the priority in 2019-2030, while the Integration of shipping services in support of ASEAN Connectivity 2025 will be done in 2031-2040, lastly, the Continuous Upgrading of Domestic Shipping to ply international routes will be accomplished in 2041-2050; (2) Maritime Tourism, the following activities will be prioritized with its corresponding target years.

c. Issues and Challenges

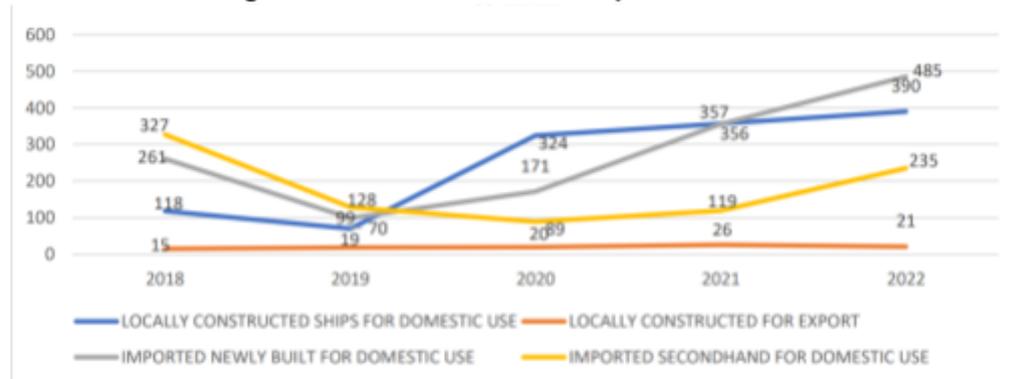
According to the Organization for Economic Cooperation and Development (OECD), maritime industries face many challenges, such as persistent supply and demand imbalances, environmental imperatives, employment issues related to the aging of the labor force as well as the safety of workers in the shipbuilding and shipping industries (*Workshop on Maritime Clusters and Global Challenges - OECD*, 2016).

In regards to the Philippine setting, particularly the SBSR sector, the shipyards serving the local market (class b and c, see figure 2.10) often face pressure from the customer side due to ship owners having a high bargaining power. They frequently push shipyards to accept prices (ships intended for domestic use) just enough to keep them afloat. To which, its implications cause the shipyard to have barely enough to afford the appropriate conditions for a proper health and safety environment. Hence, they often carry out their operations in a sub-standard environment.

Additionally, they often have “high costs of doing business caused by infrastructure problems such as; underdeveloped and congested roads, causing constant delays within the supply chains; pervasive ‘red tape’ and bureaucracy of government agencies, complicating business in many cases and prolonging processes unnecessarily; expensive importation of most of the input materials for shipbuilding, as the upstream supply chain does not exist domestically; and lastly and unreliable supply of electricity and high prices, with 18.2 USc/ kWh for industrial supply, ranking among the highest in Asia in 2012, this is due to the fact that the Philippine government does not subsidize power companies unlike other ASEAN countries” (Richter, 2016).

Moreover, according to Aboitiz InfraCapital, the lack of local suppliers presents a major challenge in the industry. To further detail, a good amount of the necessary inputs needed to build, repair, and maintain ships has to be imported. This in turn creates gaps in the ability to construct and service vessels, which consequently brings down the competitiveness of local shipyards.

Figure 2.14 - Total Number of Ships Acquired for Domestic Use and Export through Local Construction and Importation from 2018-2022



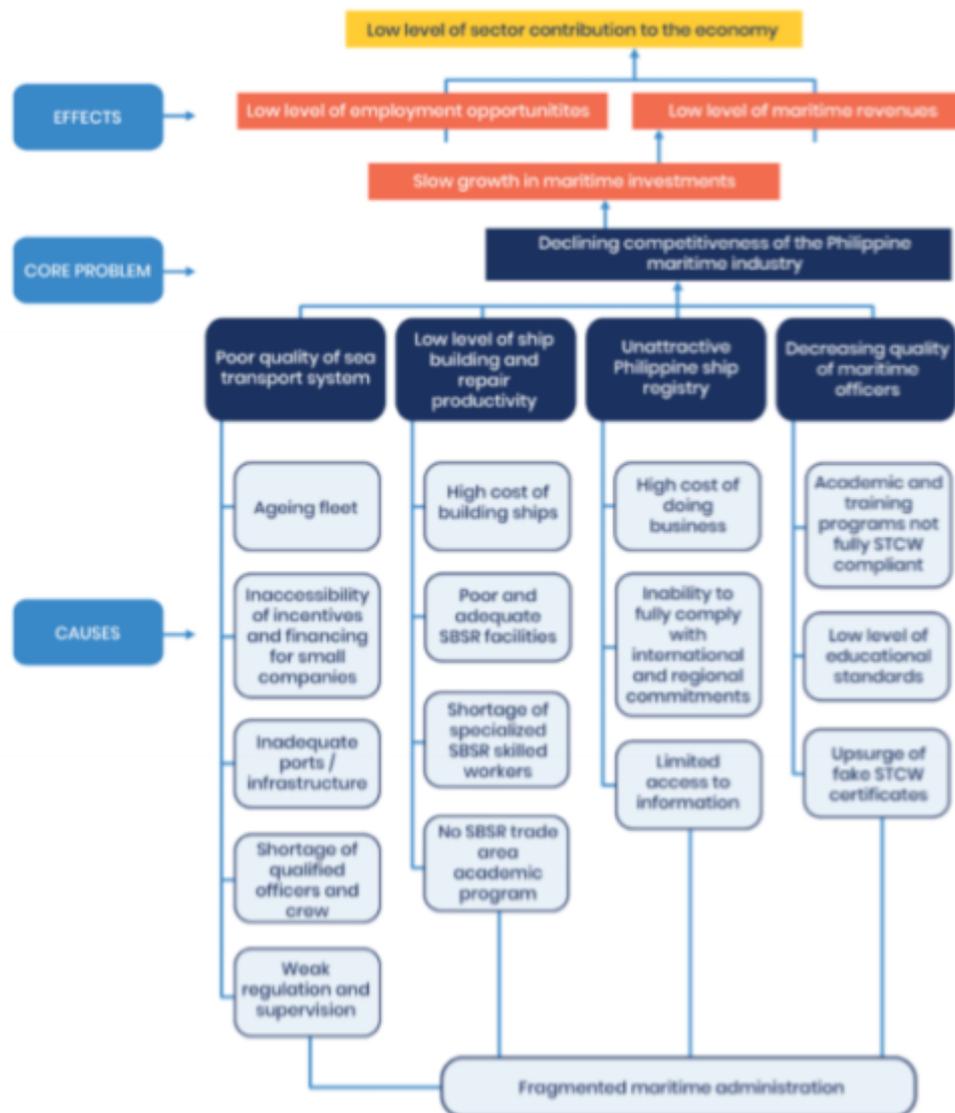
Source: MARINA - SBSR Situation Report (2022)

According to figure 2.14, it shows that there is a significant gap in the capacity of our SBSR industry wherein a significant portion of ships being used domestically, whether it is secondhand or newly built, are being imported rather than being built domestically.

Although, for this opportunity in the gap to come into fruition, the problem concerning the design portion must first be addressed as stated by DOST wherein the industry lacks software and hardware. To quote a statement made by Engr. Jacklyn Descartin, Chairperson of the Naval Architecture and Maritime Engineering at the University of Cebu Maritime Education and Training Center, “the university has produced graduates who were taught manual drawing. But the university is catching up with the shift in technology: From basic to AutoCAD”. She further states that technology transfer is a problem.

Although the Philippines has a key advantage in-terms of its labor force that can provide cost-competitive service; they however fall short in terms of current skills, graduates of education and training programs related to shipbuilding often do not meet the international standards necessary. While those who do meet the international standards often leave the country for shipyards abroad in favor of higher wages. Meanwhile the training programs and facilities in the country are insufficient to meet the current standards in the international arena. Furthermore, the skills gap has been expanding with the continuous advancement in technology, changing demands in the industry. In terms of facilities and equipment, both have to meet the IACS standards or ISO certifications. Non-compliance with international standards prevents the participation of domestic yards in any segment of the global value chain.

Figure 2.15 - Problem Tree for the Maritime Industry



Source: MIDP Roadmap 2019 - 2028

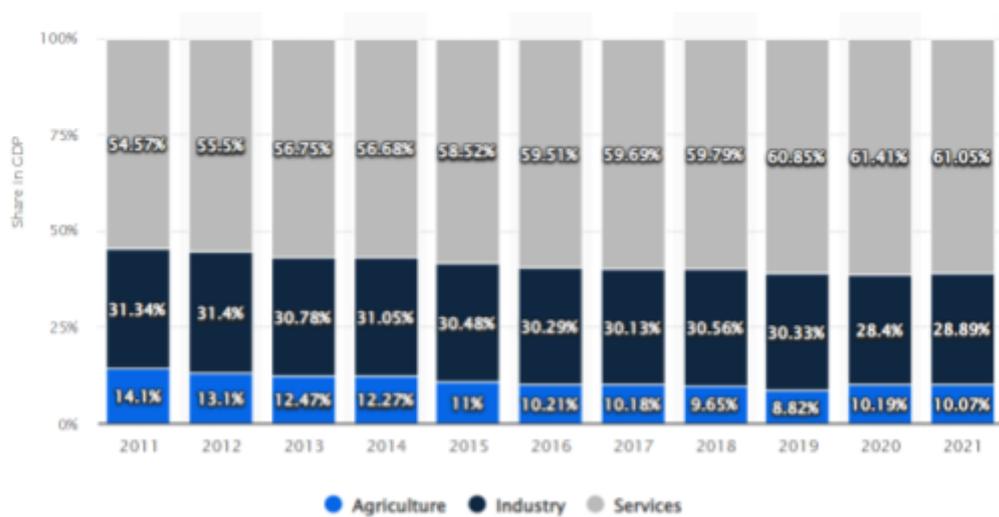
Lastly, MARINA in their MIDP roadmap for 2019-2028 has identified 4 main causes of the declining competitiveness of the Philippine maritime industry, to which they hope to resolve with the Maritime Industry Development Plan (MIDP) 2019 - 2028 (see figure 2.15). The four causes of the declining competitiveness of the Philippine maritime industry and these are poor quality of sea transport system; low level of shipbuilding and ship repair productivity; unattractiveness of the Philippine ship registry; and decreasing quality of maritime officers.

III. Main Discussion

a. Economic Contributions

As highlighted in figure 3.1, the Philippine economy comprises 3 sectors; agricultural, industrial (to which SBSR belongs), and services. Of which, the industrial sector contributes on average 30.33%. Furthermore, it is also worth mentioning that based on the illustration, there has been a steady decrease in the sector.

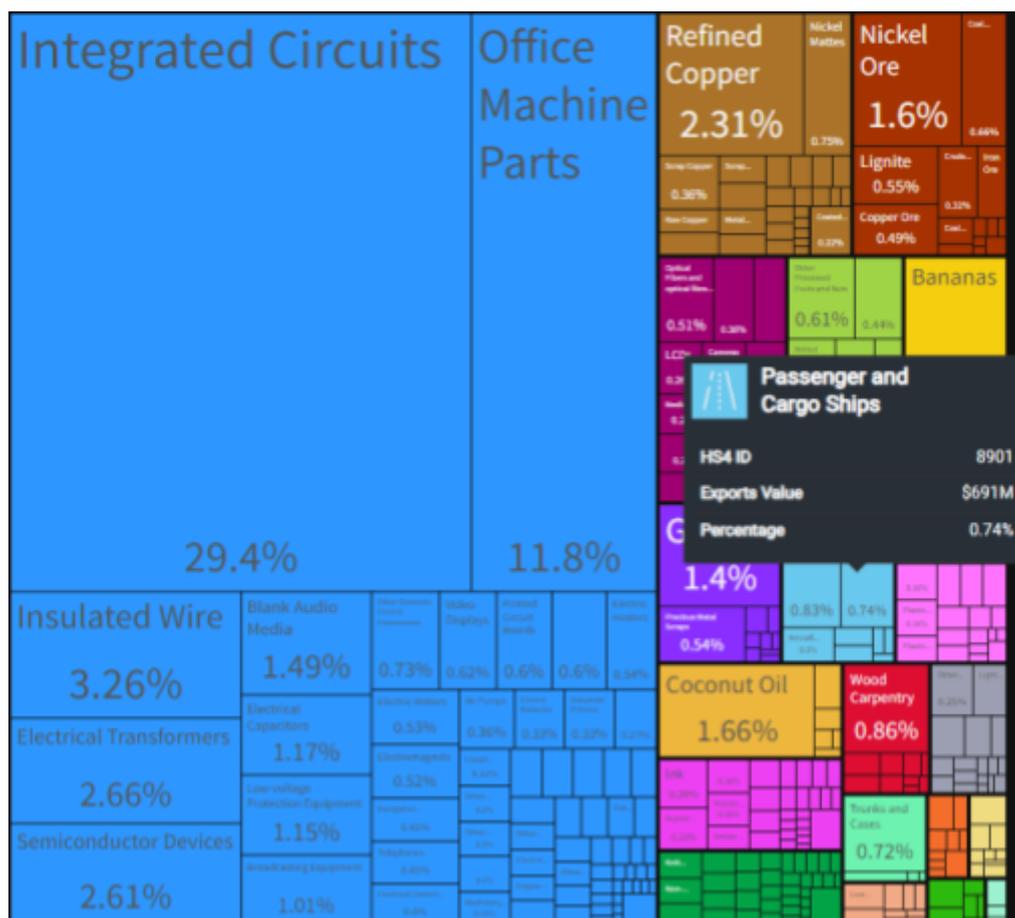
Figure 3.1 - Philippines: Share of economic sectors in the gross domestic product (GDP) from 2011 to 2021



Source: *statista.com*

In 2010, due to the country's geographical structure, a positive investment climate and a high level of skilled workforce, the Philippines became the 4th largest (see figure 2.2) shipbuilding nation after China, South Korea and Japan.³⁹ In 2015, the shipbuilding industry paid over \$500 million USD (24 billion PHP) in tax to the Philippine government. In the same year, the cumulative investments in the Philippine shipbuilding industry were around \$2.4 billion USD (116 billion PHP). Overall, the industry employed 46,000 workers (subcontractors are included).

Figure 3.2.1 - Philippine Exports (2021)



Source: oec.world

Figure 3.2.2 - Destination of Philippine Exports 2021 (SBSR)

Countries	Value	Percentage
Japan	\$417M	68.2%
Spain	\$121M	17.6%
Denmark	\$65M	9.41%
South Korea	\$28.2M	4.09%
Turkey	\$4.76M	0.69%
Pakistan	\$142K	0.021%
Total:	\$691M	100%

Source: oec.world

According to the observatory of Economic Complexity (OEC), the Philippines' economic profile for SBSR (see figure 3.2.1), only

accounts for .74% (\$691M) of the country's exports in 2021 which amounted to \$93.7B; and of that \$691M, the passenger and cargo ships were exported to the following countries (see figure 3.2.2).

In terms of investments, figures 3.3.1 and 3.3.2 show a sizeable amount of capitalization within the SBSR industry, further underlying the importance of its success.

Figure 3.3.1 - Top 8 Licensed SBSR Entities by Paid-up Capitalization 2021

SBSR Entities		Paid-up Capitalization (in Php)
1	Tsuneishi Heavy Industries (Cebu) Inc.	4,050,000,000.00
2	Keppel Philippines Marine Inc.	2,006,825,996.00
3	Keppel Subic Shipyard Inc.	1,023,022,107.00
4	Austal Philippines Pty Ltd.	573,500,000.00
5	San Andres Fishing Industries, Inc.	279,700,000.00
6	Philippine Iron and Construction of Marine Works Inc.	195,030,976.00
7	Herma Shipyard Inc.	160,000,000.00
8	Subic Dry Dock Corporation	153,437,500.00
Total:		8,441,516,579.00

Source: MARINA Statistical Report (2017 - 2021)

Figure 3.3.2 - Accreditation of Companies/ Enterprises for Philippine Registered Ships in International Trade

Year	Accreditation under MC 181		Accreditation under MC 186/DS-2020-02	
	Number	Total Paid-up Capitalization	Number	Total Capitalization
2017	61	2,179,495,424.00	487	4,091,039,702.03
2018	62	2,445,899,900.00	501	4,673,476,703.41
2019	61	2,567,513,900.00	516	8,313,024,797.18
2020	50	1,414,493,900.00	503	8,745,228,586.64
2021	48	1,535,743,900.00	495	8,795,028,208.70

Source: MARINA Statistical Report (2017 - 2021)

Figure 3.3 - Number of SBSR Employed Personnel by Region in 2022

Office	Mgmt.	Admin	Technical		Skilled		Total
			P	C	P	C	
MRO NCR	144	282	322	58	1862	530	3198
MRO I & II	2	20	2	3	10	20	57
MRO IV	35	74	78	8	250	211	656
MRO V	2	2	6	10	30	0	23
MRO VI	15	62	62	21	128	188	476
MRO VII	90	211	326	41	551	1534	2753
MRO VIII	2	3	6	0	0	29	40
MRO IX	21	43	26	19	204	245	558
MRO X	8	31	13	58	9	224	343
MRO XI	2	5	2	2	13	34	58
MRO XII	70	131	108	43	518	204	1074
MRO XIII	10	38	24	2	64	40	178
Total:	401	902	975	265	3612	3259	9414

Note: P = Permanent, C = Contractual
 Source: MARINA Situation Report (2022)

b. Employment Projection

According to Safety4Sea, the average lifespan of a ship is between 25-30 years, and anything beyond that causes the operating costs to rise greatly while at the same time placing unnecessary risk to its crew due to its unseaworthiness. Figure 3.4 below shows the average age of ships registered in the Philippines.

Figure 3.4 - Registered Domestic Ships by Average GRT and Average Age per Ship Classification as of December 2022

Ship Classification	Number	Average GRT	Average Age
Passenger	4,491	75.90	9.39
Cargo	2,368	694.96	19.38
Tanker	197	1,554.95	22.09
Tugs and Dredger	794	279.95	31.10

Fishing	7,364	38.30	14.54
Special Purpose Ship	16	1,056.32	15.21
Miscellaneous Ship	702	199.94	10.44
Recreational	3,746	-	8.24
Total	19,678	173.49	14.30

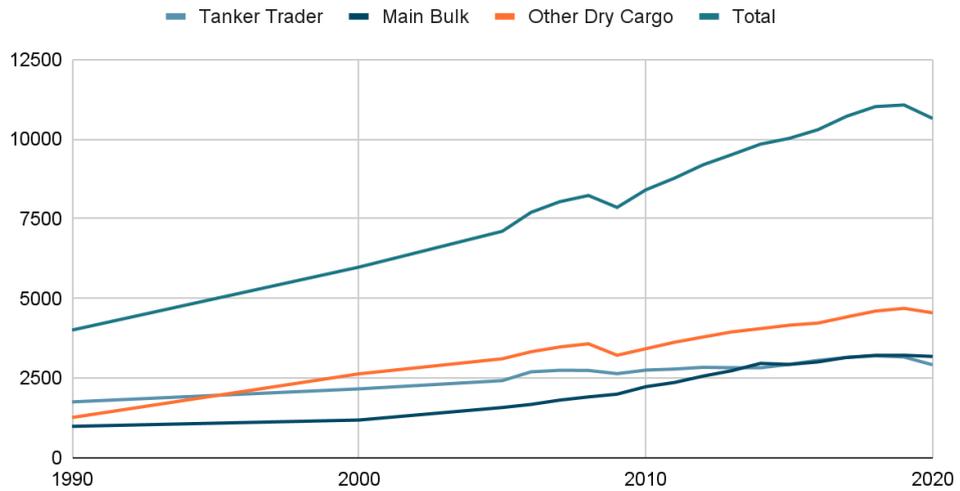
Source: 2022 MARINE Annual Statistical Report

Figure 3.5.1 - International Maritime Trade

Year	Tanker Trader	Main Bulk	Other Dry Cargo	Total
1990	1,755	988	1,265	4,008
2000	2,163	1,186	2,635	5,984
2005	2,422	1,579	3,108	7,109
2006	2,698	1,676	3,328	7,702
2007	2,747	1,811	3,478	8,036
2008	2,742	1,911	3,578	8,231
2009	2,641	1,998	3,218	7,857
2010	2,752	2,232	3,423	8,408
2011	2,785	2,364	3,626	8,775
2012	2,840	2,564	3,791	9,195
2013	2,828	2,734	3,951	9,513
2014	2,825	2,964	4,054	9,842
2015	2,932	2,930	4,161	10,023
2016	3,058	3,009	4,228	10,295
2017	3,146	3,151	4,419	10,716
2018	3,201	3,215	4,603	11,019
2019	3,163	3,218	4,690	11,071
2020	2,918	3,181	4,549	10,648

Figure 3.5.2 - International Maritime Trade (graph)

International Maritime Trade (millions of tons loaded)



Source: *unctad.org - Review of Maritime Transport (2021)*

Based on figures 3.4, 3.5.1, and 3.5.2, we see that there has been a continued increase in the volume of trade carried by ships. Although Deadweight Tonnage doesn't necessarily mean more vessels, but based on the aforementioned figures, it indicates that as the volume of trade increases, it will eventually surpass a ship's capacity, thus necessitating a higher number of merchant vessels.

Figure 3.6 - Demographic Profile of Top SBSR Countries

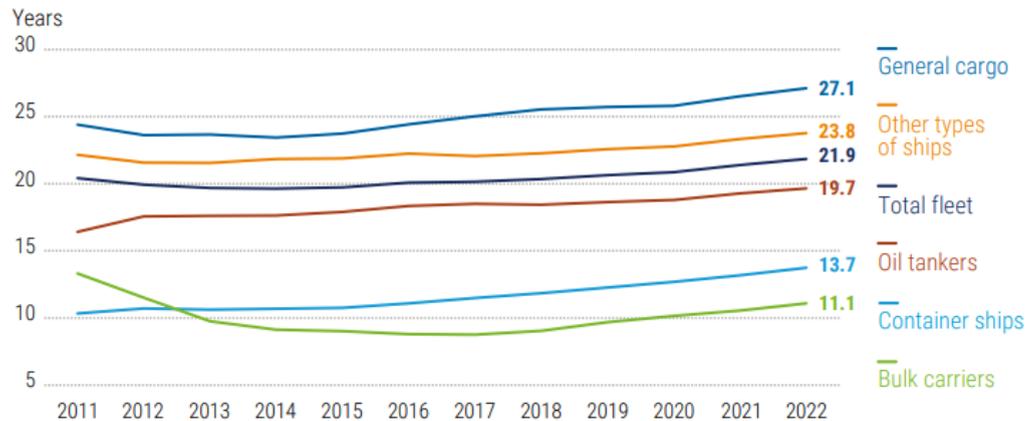
Country	Population	Yearly Change (%)	Net Change	Migrants	Fert Rate	Med Age	World Share (%)
China	1,425,6761,352	-0.02	-215,985	-310,220	1.2	39	17.72
S. Korea	51,784,059	-0.06	-31,751	29,998	0.9	44	0.64
Japan	123,294,513	-0.53	657,179	99,994	1.3	49	1.53
Philippines	117,337,368	1.54	1,778,359	-69,996	2.7	25	1.46

Source: *worldometer.info*

As we can see in figure 3.6, the Philippines, among the other top SBSR countries, has the most favorable figures. Most notably, it is the only whose fertility rate meets the minimum required to replenish and grow its population; thus making it the only country to have a net positive in its increase of population; of which its median age is

considerably young at just 25 years old, compared to its peers, whose median working age population is at the late 30's (39) as its lowest.

Figure 3.7 - Average age of merchant vessel fleet (international)



Source: UNCTAD calculations, based on data from Clarksons Research.

Note: Propelled seagoing vessels of 100 gross tons and above, as of 1 January 2022.

Source: <https://hbs.unctad.org/merchant-fleet/>

Aside from this, we can also see that the current age of the fleet (both domestic and international, see figures 3.4 and 3.7) has been steadily advancing. As previously mentioned, the average lifespan of a ship is 25-30 years and anything beyond that just increases the operating costs of a vessel due to the indirect costs brought about by the inefficiencies of the ship itself either through higher fuel consumption due to the increased drag on a ship's hull as a result of wear and tear, fines from breakdowns, and penalties as a result of harm and injury to the crew (Aztec Marine Agencies Inc., 2017).

The aforementioned above, coupled with the Philippines' unique geographical advantages; open the opportunity for the Philippines to further cement and improve its position in the SBSR industry on the global stage.

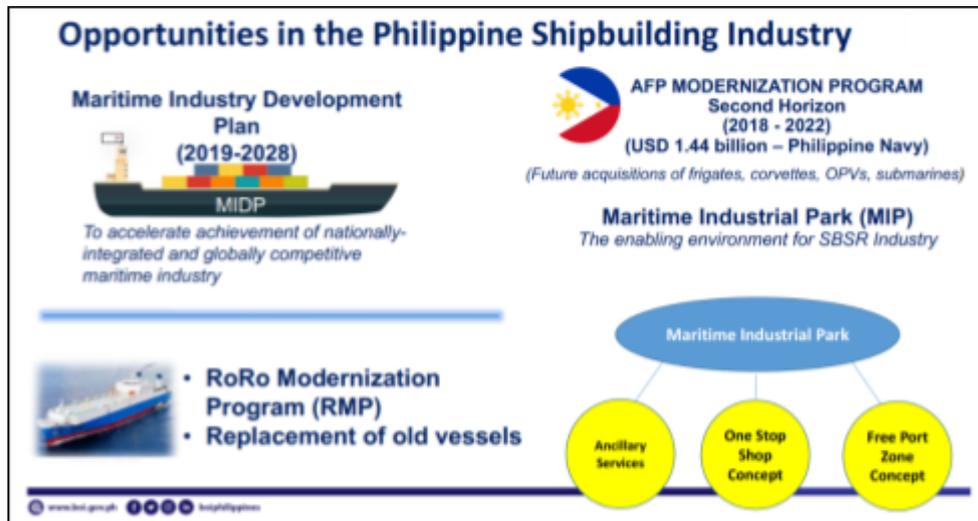
As for the domestic market, as outlined in the MIDP (2019 - 2028); Core Program 1 - Modernization and Expansion of the Domestic Shipping Industry, this would necessitate the shipbuilding industry for the domestic market as it aims to upgrade and replace the nation's older fleets. This is coincidentally in line with the AFP's push to modernize its navy (see figure 3.9) wherein they are aiming for the new ships to be made in-house as mentioned in an article by Sadodong (2022).

Figure 3.8 - Snapshot of the Philippine Shipbuilding Industry



Source: MARINA - National Maritime Week Presentation (2020)

Figure 3.9 - Opportunities in the Philippine Shipbuilding Industry



Source: MARINA - National Maritime Week Presentation (2020)

MARINA, in its presentation during the National Maritime Week (2020) presentation, the Philippine shipbuilding industry mainly revolves around production of bulk carriers and containerships and ship repair. Whereas bulk carriers and containerships on the other hand that are produced by foreign-owned shipbuilders, are mainly exported. While domestic shipyards primarily engage in ship repair.

IV. Skills Needs

The Maritime Industry Development Plan indicates that TESDA is responsible for the following program output indicators: 1) number of new education and training standards, developed on professional, skills or expertise programs; and 2) % Increase of certified Welders and Fitters.

Following the findings on the skills and qualifications that are found to be the core competencies needed in the shipbuilding and ship repair industry, a mapping of corresponding TVET qualifications is made below:

Sector	Jobs/ Occupation	Corresponding TVET Qualification
Shipbuilding & Ship Repair	Project Supervisors	No equivalent Training Regulation
	Boilermaker <i>Other title: Marine Boilermaker</i>	No equivalent Training Regulation
	Carpenter <i>Other titles: Builder, Woodworker</i>	Carpentry NC III
	Heavy Duty Mechanic <i>Other title: Heavy duty equipment technician</i>	No equivalent Training Regulation
	Industrial Electrician <i>Other titles: Marine Electrician, Electrical Control Builder</i>	Marine Electricity NC II
	Joiner <i>Other titles: Cabinet Maker, Wood Worker, Cabinetry Carpenter</i>	Carpentry NC II* <i>(has basic joinery skills as a required skill)</i>
	Machinist <i>Other titles: Tooling Inspector, Toolroom Machinist, Precision Machinist</i>	Machining NC III Machining NC II Machining NC I
	Metal Fabrication/Shipfitter <i>Other titles: Marine Fitter, Platework Fabricator</i>	No equivalent Training Regulation
	Millwright <i>Other titles: Industrial Mechanic, Maintenance Mechanic, Plant</i>	Plant Maintenance NC I

	<i>Maintenance Mechanic</i>	
	Painter/Coater	Boat Building (Composite Materials) Level II
	Painter & Decorator <i>Other titles: Detailer, Finisher</i>	Construction Painting II* <i>(core competencies are similar to that of key responsibilities)</i>
	Pipefitter/Steamfitter <i>Other titles: Marine Pipefitter, Fire Sprinkler Fitter, Sprinkler System Installer, Apprentice Pipe Fitter-Steamfitter)</i>	Pipefitting (Metallic) NC II
	Plumber <i>Other titles: Marine Plumber, Plumbing Mechanic, Maintenance Plumber</i>	Plumbing NC I Plumbing NC II Plumbing NC III
	Sheet Metal Worker <i>Other titles: Platework Fabricator, Platework Fitter</i>	No equivalent Training Regulation
	Welder <i>Other titles: Welder, Fitter, Fabricator</i>	Flux Cored Arc Welding (FCAW) NC I Flux Cored Arc Welding (FCAW) NC II Flux Cored Arc Welding (FCAW) NC III Gas Metal Arc Welding (GMAW) NC I Gas Metal Arc Welding (GMAW) NC II Gas Metal Arc Welding (GMAW) NC III Gas Tungsten Arc Welding (GTAW) NC II Gas Tungsten Arc Welding (GTAW) NC IV Gas Welding NC I Gas Welding NC II Shielded Metal Arc Welding (SMAW) NC I Shielded Metal Arc Welding (SMAW) NC II

		Shielded Metal Arc Welding (SMAW) NC III Shielded Metal Arc Welding (SMAW) NC IV Submerged Arc Welding (SAW) NC I Submerged Arc Welding (SAW) NC II
	Rigger	Rigging NC I
	Inboard Outboard Mechanic <i>Other titles: Small Engine Mechanic, Power Equipment Technician, Small Equipment Mechanic, Small Engineer Repairer</i>	Motorcycle/Small Engine Servicing NC II
	Sandblaster <i>Other titles: Metal Fabrication Laborer, Bench Grinder, Chipper, Finisher</i>	No equivalent Training Regulation
	Electrical and Electronics Engineering Technicians <i>Other titles: Test technician, Computer Systems Technician, Communication Technician</i>	No equivalent Training Regulation
	Mechanical Engineering Technologists and Technicians <i>Other titles: Engineering assistant, Ship Repair Technician, Technical Inspector, Marine Engineering Technologist</i>	No equivalent Training Regulation

Source: marineinsight.com - *Different Jobs in Shipyard and Shipbuilding Industry*
workbc.ca - *Shipbuilding and Ship Repair Occupations*

It should be taken note that most of the qualifications listed here that TESDA has a regulation for are from different sectors such as metals and engineering, automotive and land transportation, and construction. Hence, some adjustments might need to be made in order to be fully compatible with the nature of the work.

V. TVET Capacity

Table 5.1: Enrolled, Graduates, Assessed and Certified by Qualification as of June 2023

Qualification Title	Enrolled	Graduates	Assessed	Certified
Boat Building (Composite Materials) Level II	0	0	0	0
Carpentry NC II	1,786	1,847	5,748	5,603
Carpentry NC III	76	74	66	66
Construction Painting II	352	379	715	701
Electrical Installation and Maintenance NC II	6,158	5,342	22,602	21,293
Electrical Installation and Maintenance NC IV	0	0	29	29
Flux Cored Arc Welding (FCAW) NC I	0	0	0	0
Flux Cored Arc Welding (FCAW) NC II	28	48	384	384
Flux Cored Arc Welding (FCAW) NC III	0	0	0	0
Gas Metal Arc Welding (GMAW) NC I	124	89	85	85
Gas Metal Arc Welding (GMAW) NC II	169	209	671	657
Gas Metal Arc Welding (GMAW) NC III	0	0	0	0
Gas Tungsten Arc Welding (GTAW) NC II	317	294	597	591
Gas Tungsten Arc Welding (GTAW) NC IV	0	0	0	0
Gas Welding NC I	0	0	0	0
Gas Welding NC II	2	0	0	0
Machining NC I	75	0	108	104
Machining NC II	210	170	461	431
Machining NC III	0	0	0	0

Marine Electricity NC II	0	0	0	0
Motorcycle/Small Engine Servicing NC II	198	104	2,598	2,534
Pipefitting (Metallic) NC II	146	159	1,015	1,003
Plant Maintenance NC I	0	0	0	0
Plumbing NC I	301	369	334	330
Plumbing NC II	532	527	901	839
Plumbing NC III	0	0	0	0
Shielded Metal Arc Welding (SMAW) NC I	5370	4,979	10,054	9,380
Shielded Metal Arc Welding (SMAW) NC II	5368	4,928	15,590	14,837
Shielded Metal Arc Welding (SMAW) NC III	208	212	244	241
Shielded Metal Arc Welding (SMAW) NC IV	25	25	0	0
Submerged Arc Welding (SAW) NC I	0	0	0	0
Submerged Arc Welding (SAW) NC II	0	0	0	0

Source: TESDA - ICTO

Table 5.2: Enrolled, Graduates, Assessed and Certified by Qualification as of December 2022

Qualification Title	Enrolled	Graduates	Assessed	Certified
Boat Building (Composite Materials) Level II	0	0	0	0
Carpentry NC II	8,859	9,776	11,977	11,462
Carpentry NC III	26	48	134	128
Construction Painting NC II	2,096	2,383	2,571	2,490
Electrical Installation and Maintenance NC II	25,830	26,958	42,191	39,054
Electrical Installation and Maintenance NC IV	0	0	10	10
Flux Cored Arc Welding (FCAW) NC I	6	47	0	0

Flux Cored Arc Welding (FCAW) NC II	168	166	413	412
Flux Cored Arc Welding (FCAW) NC III	0	0	0	0
Gas Metal Arc Welding (GMAW) NC I	52	74	121	98
Gas Metal Arc Welding (GMAW) NC II	1,076	1,249	1,594	1,545
Gas Metal Arc Welding (GMAW) NC III	0	0	1	1
Gas Tungsten Arc Welding (GTAW) NC II	891	1,076	1,784	1,738
Gas Tungsten Arc Welding (GTAW) NC IV	0	0	0	0
Gas Welding NC I	25	24	37	37
Gas Welding NC II	11	16	0	0
Machining NC I	103	104	149	148
Machining NC II	715	717	1,042	968
Machining NC III	0	0	0	0
Marine Electricity NC II	0	0	0	0
Motorcycle/Small Engine Servicing NC II	1,129	1,265	5,749	5,465
Pipefitting (Metallic) NC II	397	483	1,773	1,672
Plant Maintenance NC I	0	0	0	0
Plumbing NC I	1,654	1,697	1,445	1,420
Plumbing NC II	1,934	2,101	3,400	3,099
Plumbing NC III	0	0	0	0
Shielded Metal Arc Welding (SMAW) NC I	22,957	26,820	28,034	26,588
Shielded Metal Arc Welding (SMAW) NC II	25,453	30,315	42,289	39,896
Shielded Metal Arc Welding (SMAW) NC III	785	1,059	1,150	1,120
Shielded Metal Arc Welding (SMAW) NC IV	0	0	49	41

Submerged Arc Welding (SAW) NC I	0	0	0	0
Submerged Arc Welding (SAW) NC II	0	0	0	0

Source: TESDA-ICTO

Table 5.3: Summary of the Number of Registered Programs, NTTC Holders, Assessment Centers and Competency Assessors by Qualification (WTR) as of June 2023

Qualification Title	Registered Programs	NTTC Holders	Assessment Centers	Competency Assessor
Boat Building (Composite Materials) Level II	0	0	0	0
Carpentry NC II	209	629	130	239
Carpentry NC III	6	49	11	23
Construction Painting NC II	46	146	32	76
Electrical Installation and Maintenance NC II	486	0	265	499
Electrical Installation and Maintenance NC IV	2	0	4	3
Flux Cored Arc Welding (FCAW) NC I	6	0	3	0
Flux Cored Arc Welding (FCAW) NC II	15	139	16	18
Flux Cored Arc Welding (FCAW) NC III	0	1	1	0
Gas Metal Arc Welding (GMAW) NC I	15	0	10	10
Gas Metal Arc Welding (GMAW) NC II	54	341	37	75
Gas Metal Arc Welding (GMAW) NC III	3	13	3	6
Gas Tungsten Arc Welding (GTAW) NC II	69	338	448	79
Gas Tungsten Arc Welding (GTAW) NC IV	0	0	0	0
Gas Welding NC I	1	1	1	2

Gas Welding NC II	3	0	2	2
Machining NC I	12	0	5	6
Machining NC II	37	133	26	30
Machining NC III	3	20	1	1
Marine Electricity NC II	0	0	0	0
Motorcycle/Small Engine Servicing NC II	101	318	58	86
Pipefitting (Metallic) NC II	12	53	11	28
Plant Maintenance NC I	0	0	0	0
Plumbing NC I	39	0	29	23
Plumbing NC II	95	222	56	68
Plumbing NC III	1	18	2	3
Shielded Metal Arc Welding (SMAW) NC I	588	2	314	411
Shielded Metal Arc Welding (SMAW) NC II	767	2364	368	649
Shielded Metal Arc Welding (SMAW) NC III	61	348	52	71
Shielded Metal Arc Welding (SMAW) NC IV	5	54	7	6
Submerged Arc Welding (SAW) NC I	0	0	0	0
Submerged Arc Welding (SAW) NC II	0	0	0	1

Source: TESDA - Certification Office

VI. Demand-Supply Analysis

Of the 24 skills and qualifications listed needed in the SBSR industry, TESDA only has training qualifications for 12 of them. Of which, those 12 are mostly qualifications from other sectors, primarily construction. Furthermore, of those 12, there is a total of 30 training regulations and 1 competency standard that corresponds to them; and of those 31, 13 of them have had 0 enrolled, graduates, assessed and certified as of June 2023. Coincidentally, the same number applies to its regulations that don't have any infrastructures.

Furthermore, as earlier mentioned, there is a lack of skilled labor that has higher levels of certification (NC IV) in order to be eligible to work in shipyards that contribute to the global value chain of the shipbuilding industry. Though it should be noted that graduates from TESDA programs possess the welding skills for domestic repair needs, but a more advanced level of the program, or more graduates from NC IV level are needed to meet international standards. The industry requires workers who have a knowledge of the properties of the materials (i.e. steel, aluminum alloy).

VII. Ways Forward

The SBSR industry in the Philippines has enormous potential to contribute to the Philippine economy given its naturally strategic position along the trade routes and as well as its geographically blessed features that give it an edge towards catering to the thousands of ships that coast along and adjacent to its waters. Although the Philippines currently holds the rank of number four (4) in the SBSR industry globally, it has nowhere been near in dislodging anyone of the three nations before it. With that said, here are some of the recommendations TESDA should take into consideration in order to support the MARINA's goals in creating a maritime industrial hub.

In order to address the skills requirements, especially in the MIDP 2019-2028, the following actions are recommended:

1. To increase the number of new education and training standards, developed on professional, skills or expertise programs,
 - a. TESDA shall identify and develop new Training Regulations and Competency Standards for possible new jobs/skills/occupations to emerge as a result of changing trends in the SBSR industry by engaging the relevant industries, government agencies, and sector stakeholders. In the mapping of skills requirements in part IV., the following requirements do not have corresponding TVET qualifications:
 - i. Project Supervisors
 - ii. Boilermaker
 - iii. Heavy Duty Mechanic
 - iv. Sheet Metal Worker
 - v. Sandblaster

- vi. Electrical and Electronics Engineering Technicians
- vii. Mechanical Engineering Technologists and Technicians

It is hoped that TESDA can develop the higher level qualifications together with the industry stakeholders.

- b. TESDA shall also review and update the necessary programs to ensure they are still relevant with the current SBSR trends. The following qualifications in particular should be considered:

- i. Electrical Installation and Maintenance NC IV
- ii. Flux Cored Arc Welding (FCAW) NC I
- iii. Flux Cored Arc Welding (FCAW) NC I
- iv. Flux Cored Arc Welding (FCAW) NC III
- v. Gas Metal Arc Welding (GMAW) NC III
- vi. Gas Tungsten Arc Welding (GTAW) NC IV
- vii. Gas Welding NC I
- viii. Gas Welding NC II
- ix. Machining NC III
- x. Marine Electricity NC II
- xi. Plant Maintenance NC I
- xii. Plumbing NC III
- xiii. Shielded Metal Arc Welding (SMAW) NC IV
- xiv. Submerged Arc Welding (SAW) NC I
- xv. Submerged Arc Welding (SAW) NC II

- 2. To achieve the required increase of certified Welders and Fitters by 25% increase every year from 2024 till 2028, and an overall increase of 250% by the end of the MIDP,

- a. TESDA should consider prioritizing the relevant TVET programs for welders and fitters in the scholarship programs.
- b. The adoption of XR technologies currently being explored by the TESDA Certification Office. According to their results, XR technology significantly decreases the amount of time needed to train workers. Which then translates to more enrollees being trained for their eventual assessment and certification.
- c. Forge additional partnerships with the private sector to increase the number of Enterprise-based training programs.

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