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Analysis of the Needs of Seafarer Officers on Merchant Ships

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Abstract. The principal issue discussed in this research is "Analysis of the Needs of the Seafarer Officers on Merchant Ships" Based on the principal problems, this research aimed to find out the number of seafarer officers employment who currently work in the merchant ship and to identify the development of merchant sailing industry in Indonesia and the world in the last five years. Data collection methods employed the literature study, observation, and interview. The data obtained were then analyzed using descriptive and qualitative techniques using a regression approach. The results of this study based on the data analysis result showed that the number of Indonesian graduates Seafarer at the level of ANT I/ATT I, ANT II/ATT II, ANT III/ATT III for the last five years on the board of examiner for seafarer expertise increased in 2016 by 65% of the ANT, in 2017 it experienced a decline by 1.3% of the ANT and in 2018 it witnessed a significant decline by -5.8%. In 2019 it increased by 18 %. So it can be said that the issuance of seafarer competence certificates of officer level increased by 19.6% per year. The growth value of merchant ship fleet based on the type of sailing nationally increased from 2015 to 2019. In 2016, it increased significantly by 45%, while in 2017, it decreased by 0.3%. In 2018, it grew by 7%, and in 2019, it grew by 19%, so if it was put on an average value from 2015 to 2019, it experienced growth by 2.3%.

INTRODUCTION

International Labor Organization (ILO) realizes that the seafarers are the workers who have the work character and nature different from other sectors. The ILO is also aware that based on the survey conducted by various organizations, the transportation of goods from one place to another, from one country to the other, 90% of it is performed using sea transports. Nowadays, more than 1.2 trillion seafarers work to deliver goods through ships in which they work. Therefore, the members of ILO continuously discuss how to improve the welfare of seafarers through the provisions that can be accepted globally.

As one of the largest maritime countries globally, Indonesia has a great opportunity to fill the needs of human resources in the field of seafarers. According to the Chairman of Higher School of Marine Science (Sekolah Tinggi Ilmu Pelayaran/STIP) Jakarta Marihot, the number of sailors worldwide today is reaching 1.6 million. At the same time, the ocean freight industry in the world still needs at least 83,000 seafarers.

Regarding the labor supply of seafarers, especially in the level of the officer whose certificate of competency as higher as Nautical studies/Marine Engineering Level III, II or I, at the moment, Human Resources Development Agency of Transportation (BPSDMP) as a party that has the primary duty to formulate and analyze the policy of human resource development programs of transportation in Indonesia manages 8 (eight) Polytechnic School of Merchant Marine which are located in various regions in Indonesia. Polytechnic of Merchant Marine, both public and private, is a sailing school with a Diploma III or Diploma IV in the field of sailing with study duration from 3 (three) years to 4 (four) years, each year the PIP or AIP graduate approximately 600 officers of merchant shipping that are ready to work on the ship.

One of the considerations in conducting this research is that due to the higher number of sailing schools operated nowadays, it is being a concern that it will cause any constraints and competition to the graduates of those schools for getting jobs. The opportunity for students to get a job offer is influenced by the number of graduates in a region, which

can be different from a region to others, caused by the number of schools that exist in the area, as well as the opportunities provided by the shipping industry in the local area that will recruit them.

Based on the previous description, it is necessary to research the needs of the sailor officer worker on the merchant ship of the shipping company in Indonesia. The study of the workforce's needs is focused on the number of Politeknik Ilmu Pelayaran schools and graduates they produce and the strategic program of human resource development for Officer level as well as the prospect of the shipping Industry for a merchant ship in the next five years. The urgency of conducting this research was to obtain an overview of the workforce's needs with an educational background of an officer at the Polytechnic School of Maritime Science or equivalent to sailing education academy adapted to the development of shipping companies in Indonesia the world.

RESEARCH METHOD

This research used a survey method by utilizing questionnaires and direct interviews. In addition, the data were also obtained through the literature review of the publication of the policy, the statistical publication of merchant ships nationwide, public consultation with the owner of the company and the head of INSA.

The data analysis technique used in this research was analyzing the trend with a regression approach. The projection procedures are as determine the annual demand of labor. Wherever possible, the supporting time-series data should be available. The need for labor was the dependent variable (Y), while the increase of years was used as the independent variable (X). The last one is to select the appropriate trend model.

The data obtained often had a different response. Therefore it was necessary to select the most appropriate model under the condition of the obtained data. The analysis models that were verified were linear, quadratic, cubic, and exponential. The selection of the most appropriate model to use was based on the general logic or preview of the scatter plot.

RESEARCH FINDING

Polytechnic/Academy of Marine Merchant for Nautical Study and Marine Engineering was started in 2019 where 5 (five) Schools of Marine Merchant Education and Training (Balai Pendidikan dan Pelatihan Ilmu Pelayaran/BP2TL) transformed into Marine Merchant Polytechnic. Following the policy set by the Higher Education Ministry in 2019, they became the Polytechnic of the Marine Merchant that performed the higher vocational education field of transportation. Where fields of expertise developed were the Nautical Studies Level III and Marine Engineering Level III. However, the availability of those training institutions is a force that needs to be optimized to achieve more competent seafarers who will have the chance to replace foreign workers (TKA) in the shipping industry or the opportunity to fill the demand for seafarers labor abroad. This is possible because some foreign countries have acknowledged the competence produced by the Polytechnic of Marine Merchant/Academy of Marine Merchant in the middle level. The spread of secondary vocational education in marine and fisheries in each of the provinces in Indonesia in 2019 can be seen in Table 1.

TABLE 1. The distribution of the number of higher education institutions for marine merchant studies.
(Polytechnic/Academy of Marine Merchant)

No	Province	Managed by the Government	Managed by Private Body	Total	Percentage (%)
1.	Sumatra	1	2	3	11.1
2.	Java and Bali	5	11	16	59.3
3.	Kalimantan	0	2	2	7.4
4.	Sulawesi	3	2	5	18.5
5.	NTB and NTT	0	0	0	0
6.	Papua	1	0	1	3.7
	TOTAL	9	17	26	100

Standard of Training, Certification, and Watchkeeping [1] in principle, organizes the Training, Exam, and Certification and the ocean watchkeeping for the crew of the ship. The classification for Certification of Seafarers in this Convention was ratified by Government Regulation No.7 in 2000 [2] about Seafarer, wherein the rules of Certification of Seafarers is divided into three competencies, Type of Certificate of Competence for Seafarer referred

to in Article 3 paragraph (2) letter (a) consists of a Certificate of Competence in Nautical, Certificate of Competence in Machine Engineering, and Certificate of Competence in Electronical Radio. The type of Certificate of Proficiency for Seafarers, as referred to in Article 3 paragraph (2) letter (b) consists of a Certificate of Basic Competence for Seafarers and a Certificate of Advance Competence. All three competencies are listed in table 2 :

TABLE 2. Grouping the level of seafarer competencies

No	Types of Competencies	Level of Competencies	Minimum Requirements of Proficiency Cert.
1.	Nautical Study (ANT)	ANT-I	BST,BOCT,AFF,MFA, MC, RS, US,
		ANT-II	BST, BOCT, AFF, MFA, MC, RS, US,
		ANT-III	BST, BOCT, AFF, MFA, MC, RS, US,
		ANT-IV-V	BST,BOCT,AFF,MFA
		ANT-Basic	BST,BOCT,AFF,MFA
2.	EXPERT (ATT)	TEKNIKA ATT-I	BST,BOCT,AFF,MFA, MC
		ATT-II	BST,BOCT,AFF,MFA, MC
		ATT-III	BST,BOCT,AFF,MFA, MC
		ATT-IV-V	BST,BOCT,AFF,MFA, MC
		ATT-Basic	BST,BOCT,AFF,MFA,
3.	Certificate of Competence for Electronical Radio	Cert. Electronic Radio Lvl 1	
		Cert. Electronic Radio Lvl 2	
		Cert. General Operator	
		Cert. Limited Operator	

The survey conducted in 6 Islands in Indonesia spreading across several counties and cities in the territory of the province, the retrieval of primary data about the graduates of the Polytechnic/Academy in this study are divided into two categories, i.e., graduates of Polytechnic education/Academic program of Nautical and Engineering studies. The obtained data in the number of graduates of the Polytechnic/Academic in each province from 2015 to 2019 which were collected from 26 schools showed a higher percentage of an annual number of graduates of Nautical study higher than Engineering and the number of graduates Engineering less than 20% of the number of graduates in Nautical (Table 3)

TABLE 3. Number of Graduates of the Polytechnic/Sailing Academy program of Nautical and Engineering studies on 26 Polytechnics/Academies from 2015 until 2019

Study program	in					Total
	2015	2016	2017	2018	2019	
Nautical	1030	1331	1174	1088	304	4927
Engineering	762	638	934	716	246	3296
Total	1792	1969	2108	1804	550	8223

Based on the survey data obtained from DPKP Center as the Organizer of the Seafarers Exam at the Level of Nautical and Engineering Competence from 2015 until 2019, the data yield a record of the number of participants who graduated, as seen in Table 4.

TABLE 4. The Number of the Certificate of Competence for Nautical Level Issued based on the Level of Competence.

No	Seafarer Certificate	2015	2016	2017	2018	2019
1	ANT-I	1,476	1,787	983	574	2,375
2	ANT-II	1,697	3,146	1,719	1,067	2,269
3	ANT-III	2,417	3,135	3,428	2,111	3,587
4	ANT-III Management	-	4,661	3,511	3,370	1,911
5	ANT-IV	1,904	1,539	4,786	2,840	3,558
6	ANT-IV Management	-	4,745	4,848	3,499	2,732
Total		7,495	19,013	19,275	13,461	16,432
Percentage			65 %	1,3%	-5.8%	18%

Based on the data in table 4 above, it is concluded that the issuance of a certificate by the Board of Competency Testing for Seafarers in the level of Nautical Competence (ANT) had increased from 2015 to 2016. It grew by 65% in 2016 and 1.3% in 2017, but decreased by 5.8% in 2018. However, it increased by 18% in 2019. If we observe the table above, it can be concluded that from 2015 until 2019, the increase in the number of certificates issued by the DPKP surged in 2016. However, when we put them in average value, it was still experiencing an increase of 19.6% per year.

TABLE 5. The number of the Certificate of Competence for Seafarer in Engineering Level Issued based on the level of competence

No	Seafarer Certificate	2015	2016	2017	2018	2019
1	ATT-I	1,165	1,393	700	419	1,799
2	ATT-II	1,834	2,653	1,442	946	1,642
3	ATT-III	2,556	2,755	2,999	2,330	3,268
4	ATT-III Management	-	5,570	3,226	3,111	1,978
5	ATT-IV	1,386	1,256	3,602	2,186	2,853
6	ATT-IV Management	-	3,680	3,410	2,644	2,157
Total		6,941	17,307	15,379	11,636	13,697
Percentage			59,8%	-12,5%	-32,1%	15%

Based on the data in table 5 above, it was found that the issuance of certificates of Engineering level competence increased by a total of 59.8% in 2016, but fell by 12.5 % in 2017 and 32% in 2018, but again it increased to around 15% in 2019. However, when put in an average value, it still showed an increase of 7.55% per year. The development of a Fleet of merchant Ships Nationally (Indonesia) Based on Ownership.

The growth of a fleet the national shipping or ship in Indonesia increased up to two-fold from 2015 to 2019. Not only a fleet of ships but also the number of national shipping companies increased over the range time of the last five years. According to Carmita (Chairman of the INSA), the significant growth in the national shipping industry results from sabotage law that applied since 2005 [3]. Where the sabotage law is the exclusive right of a country to implement the legislation itself in the field of land, water, and air in the scope of its territory, this principle is formally valid through Presidential Instruction No. 5 of 2005 [4] about the Empowerment of the National Shipping Industry, which was published by former President Susilo Bambang Yudhoyono, or SBY. As a result, today, all the shares of the cruise market in Indonesia are controlled by national companies. Based on the statistical data of transportation, the growth of the fleet can be seen in table 6.

TABLE 6. The growth of the Marine Merchant Ships according to ownership nationally from 2015 to 2019

No	Description	Unit	2015	2016	2017	2018	2019
1	National	Unit	16,115	24,046	23,823	25,559	32,634
2	Foreign Charter	Unit	182	233	63	92	51
3	Agency	Unit	4,282	9,191	9,122	7,612	8,237
Total		Unit	20,579	33,470	33,008	33,283	40,922
percentage				38,5%	-1,4%	0,8%	18,6%

Based on table 6 above, it was found that during 2016 the growth of the fleet has increased very significantly by 38.5%. In 2017, it decreased by 1.4%, but followed by a rise of 0.8%, and starting to grow up to 18.6%, and if we took the average value in the last four years, then there was only 9.6 percent growth of the fleet. The development of a Fleet of merchant Ships Nationally (Indonesia) Based on the Type of Shipping. The growth of the national ships

based on the type of shipping is also experiencing growth over the past 5 (five) years, the growth is based on the study of statistical data in table 7 below.

TABLE 7. The growth of merchant ship fleet based on the type of shipping nationally from 2015 to 2019

No	Description	Unit	2015	2016	2017	2018	2019
1	Sea Freight (Shipping)	Unit	14,204	21,866	21,644	23,622	27,367
2	People Shipping	Unit	1,371	1,384	1,516	1,629	1,649
3	Pioneers	Unit	60	68	89	160	160
4	Special Sea Freight	Unit	1,911	2,180	2,179	1,937	3,458
Total		Unit	17,546	25,498	25,428	27,348	32,634

Based on table 7 above, it was found that the growth of the merchant ships fleet based on the type of shipping nationally from 2015 to 2019 had increased.

During 2016, the number of the fleet has increased very significantly by around 45%. In 2017, there was no increase in the number of fleet of ships, but instead, it was decreased by 0.3%. In 2018, it witnessed a rise of 7%. In 2019, it experienced a growth of 19%, and if we averaged in the last four years, then there was only 14% growth of the fleet based on the shipping nationwide. The development of a Fleet of merchant Ships in the Global (International).

At the beginning of 2019, 96.402 unit merchants ships operated worldwide. It was equal to a load capacity of 1.9 billion DWT. It was increased by 2.6 percent from the previous year. Bulk carriers (42.6 percent) and oil tankers (28.7 percent) were the types of ships with the highest population. A gas carrier is a type of ship that experienced the highest growth (by 7.25 percent), following the growth of LNG trade which kept increasing. The prospect of Gas Carrier is expected to be promising in the coming years, using LNG as a bunker ship.

The second growth is a container ship (5 percent). Types of chemical tankers and bulk carriers tend to be stable, while the oil tanker segment experienced a decline in growth.

Although the rate of growth of the fleet has continued to decline since 2011, *oversupply* still occurs in all segments.

TABLE 8. The growth of the Fleet of Ships in the Global (International)

Description	2015	2016	2017	2018	2019
The Number of Vessels by Tonnage	89,161	90,917	93,161	94,17	96,402
Percentage	-	1.9%	2.4%	1.0%	2.3%

Based on the data in table 8 above, it was found that the growth of the fleet in the Global (International) increased, although not significantly compared with the growth of the Indonesian national fleet. In 2016, the growth of the International fleet only increased by 1.9%. In 2017, it increased by 2.4%, as well as in 2018, it raised by 1.0%, and in 2019, it experienced a growth of 2.3 percent.

The needs of the number of Seafarers level Officers based on the approach of the amount of a fleet of ships nationwide. The needs of the world on seafarers are still very high. However, most seafarers graduating from official institutions in Indonesia are still far from the requirements. Moreover, many seafarers prefer to work in foreign affairs than in domestic because the 'payment' abroad is more promising.

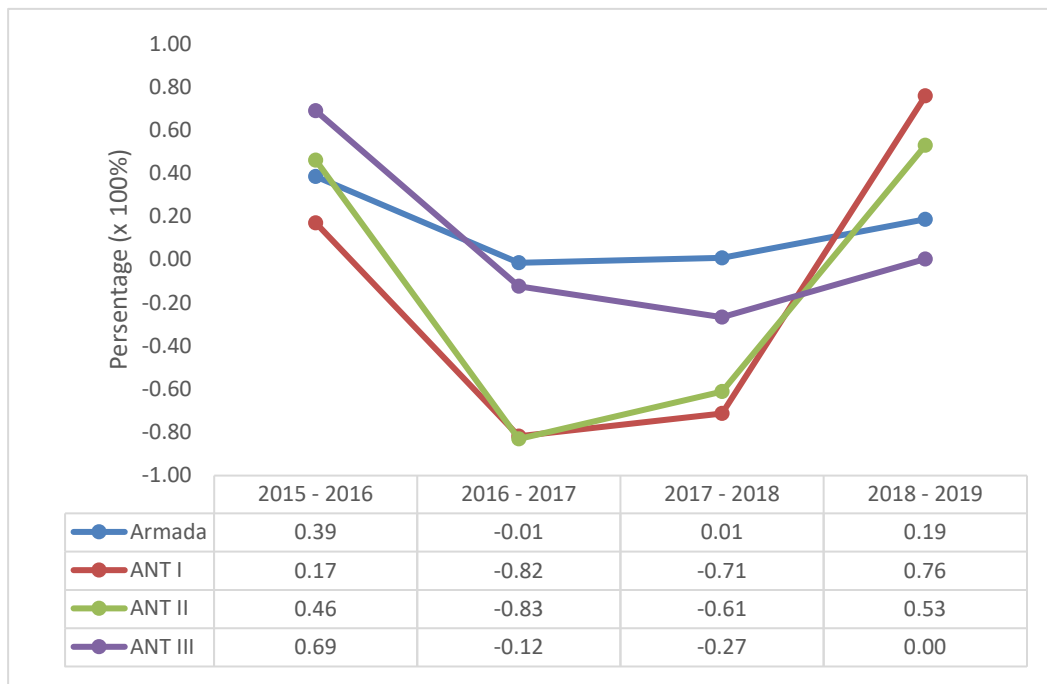
Head of the Center for Development of Human Resources (HR) on Sea Transportation, Arifin Soenardjo, revealed that the average number of seafarers who graduated from the maritime school in Indonesia is around 100,000 people per year [5]. "Of that amount, about 30 percent is absorbed to Singapore because the country is not producing sailors. While for its needs, it is far above that or about twice as much of that. Therefore, it is needed more schools in the field of maritime. The Transportation Minister stated that it is necessary to develop a professional, ethical, and visionary human resource and build infrastructure and adequate facilities to lead the country towards the welfare of a fair and prosperous society. One of the efforts is to implement the education and training of human resources relevant to the needs and right on target. According to him, the building of Indonesian man should start from the three main access, namely the construction of the quality education that is equitable, the fulfillment of quality health service, and the fulfillment of the access of the community to get a job and a decent livelihood. "Wherefore, Indonesian human resources, particularly in the transportation field, must be able to excel in all fields so they can compete globally, especially when entering the era of industrial revolution 4.0," he said. Budi said that the era of digitalization and the industrial revolution 4.0 would widely open challenges and new opportunities to develop the new education and training in answering the needs of the shipping industry in the future.

TABLE 9. the Growth of the Graduate Officer of from ANT III to ANT I

No	Year	The Growth of The National Fleet	ANT I	ANT II	ANT III
1	2015	20579	1476	1697	2417
2	2016	33470	1787	3146	7796
3	2017	33008	983	1719	6939
4	2018	33283	574	1067	5481
5	2019	40922	2375	2269	5498

TABLE 10. The Growth of Ship Fleet and the Graduate Officer from ANT III to ANT I in percent

No	Year	Percentage			
		The Growth of The National Fleet	ANT I	ANT II	ANT III
1	2015 – 2016	39%	17%	46%	69%
2	2016 – 2017	-1%	-82%	-83%	-12%
3	2017 – 2018	1%	-71%	-61%	-27%
4	2018 – 2019	19%	76%	53%	0.3%

**FIGURE 1.** The Graph of Growth in Number of Fleet and ANT Graduates 2015-2019

From table 10, it can be seen that the growth of the Fleet of Ships in 2015 and 2016 showed an increasing number of fleet of ships as much as 39%, and the Growth of the Graduate Officer of the ANT I by 17%, ANT II by 46% while the ANT III experienced a rise of 69%

In 2017, there was a decrease in the fleet of ships by 1%, accompanied by a decrease in the graduate officer for ANT I as much as 82%, ANT II as much as 83%, and the ANT III by 12%.

In 2018, there was an increase in the fleet of ships as much as 1%, while the graduates of the officer personnel decreased by 71%, ANT II by 61%, and ANT III by 27 %.

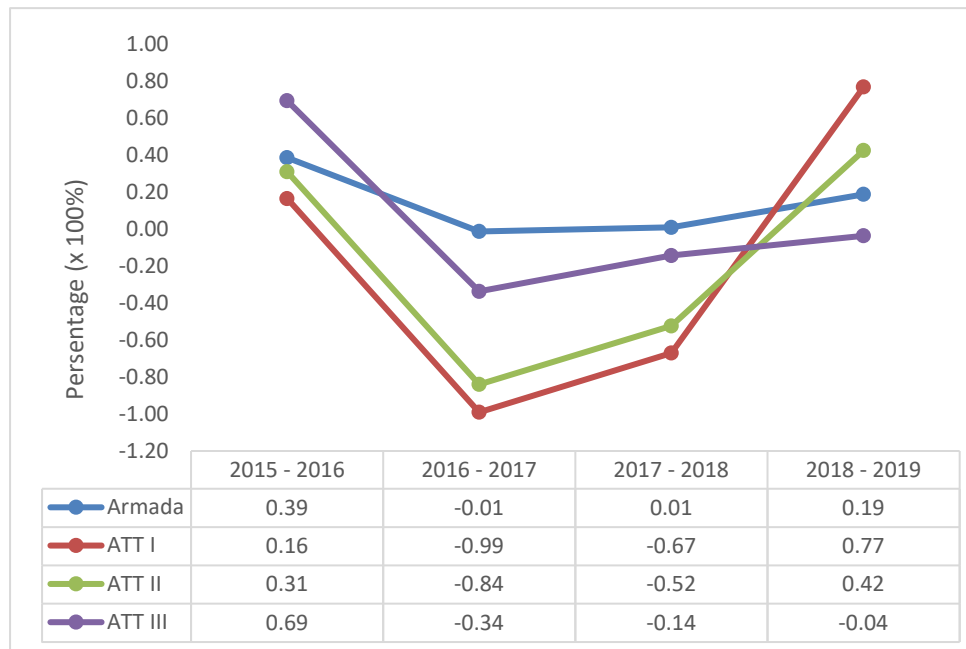
In 2019, there was an increase of fleet by 19%, as well as the increase in the growth of the graduate officer for ANT I as much as 73 %, ANT II by 53 %, and the ANT III by 0.3%

TABLE 11. the Growth of the Graduate Officer from ATT III to ATT I

No	Year	Total			
		The Growth of The National Fleet	ATT I	ATT II	ATT III
1	2015	20579	1165	1834	2556
2	2016	33470	1393	2653	8325
3	2017	33008	700	1442	6225
4	2018	33283	419	946	5441
5	2019	40922	1799	1642	5246

TABLE 12. The Growth of the Graduate Officer from ATT III to ATT I in percent

No	Year	Percentage			
		The Growth of The National Fleet	ATT I	ATT II	ATT III
1	2015 – 2016	39%	16%	31%	69%
2	2016 – 2017	-1%	-99%	-84%	-34%
3	2017 – 2018	1%	-67%	-52%	-14%
4	2018 – 2019	19%	77%	42%	-4%

**FIGURE 2.** The Graph of Growth in Number of Fleet and ANT Graduates 2015-2019

From table 12, it can be seen that the growth of the Fleet of Ships in the period of 2015 to 2016 showed an increase in the number of fleet of ships by 39%, the Growth of the Graduate Officer for ATT I as much as 16%, ATT II as much as 31% while the ANT III experience an increase as much as 69%.

In 2017, there was a decrease in the fleet of ships as much as 1%, accompanied by a decrease in the graduate officer for ATT I as much as 99%, ATT II as much as 84%, and ATT III as much as 34%.

In 2018, there was an increase in the growth of fleet by 1%, while the Graduate Officer personnel for ANT I decreased by 67%, ANT II by 52%, and ANT III by 14 %.

In 2019 there was an increase in fleet growth by 19%, accompanied by the increase in the growth of the graduate officer for ANT I by 77 %, ANT II by 42 %, and ANT III witnessed a decrease by 4%.

From the above table, it can be seen that from 2017 to 2018, a decline of the fleet and a decrease in the graduate of ship officers caused by the influence of the world economy, which was not stable, especially in the maritime sector.

Many of the fleets of ships could not be operated, causing the company's inability to hire the graduates of marine merchant schools then followed by a decrease in the number of graduates from those marine merchant schools.

In 2019, there was a significant growth of a fleet and followed by the growth of the graduate officer number with 77 % for the ANT I & 64% for ATT I. This was caused by the number of participants in the shipping service business that operated either the domestic ships and or the offshore ships. The shipping company raised the number of fleet of ships and followed by the employment absorption for graduates of marine merchant schools.

CONCLUSION

The number of Indonesian seafarer graduates on the level of ANT I, ANT II, and ANT III in the last five years which was obtained from the issuance of a certificate by the Board of Competency Testing for Seafarers in the level of Nautical Competence (ANT) had increased from 2015 to 2016 with the detailed of 65% in 2016 and 1.3% in 2017, but it was decreased by 5.8 % in 2018. However, it increased by 18% in 2019. If we observe the table above, it can be concluded that from the period of 2015 until 2019, the increase in the number of certificates issued by the DPKP surged in 2016. However, when we put them in average value, then it was still experiencing an increase of 19.6% per year.

The number of Indonesian Seafarer Graduates on the level of ATT I, ATT II, and ATT III in the last five years which was obtained from the issuance of a certificate by the Board of Competency Testing for Seafarers in the level of Marine Engineering Competence (ANT) had experienced an increase of 59.8% in 2016, but it fell as much as 12,5 % in 2017 and 32% in 2018. However, it showed an increase of 15% in 2019. However, when put in an average value, it still showed an increase of 7.55% per year. The amount of growth of merchant ships fleet based on the type of shipping nationally from 2015 to 2019 had an increase.

During 2016, the number of the fleet has increased very significantly by around 45%. In 2017, there was no increase in the number of fleet of ships, but instead, it was decreased by 0.3%. In 2018, it witnessed a rise of 7%. In 2019, it experienced a growth of 19%, and if we averaged in the last four years, then there was only 14% growth of the fleet based on the shipping nationwide.

The amount of growth in the number of fleet Globally (International) increased, although not significantly compared to the growth of the Indonesian National fleet. Where in 2016, the growth of the International fleet was only increased by 1.9%. In 2017, it increased by 2.4%, as well as in 2018, where it raised by 1.0%, and in 2019, it experienced a growth of 2.3 percent.

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