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A Study on the Problematic Factors and Recommendations of Coastal Shipping Safety Policy in the Philippines

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필리핀 연안해운 안전정책의 문제점 및 제언에 관한 소고

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Abstract

This paper is aiming at introducing an useful indications needed to set up the coastal shipping safety policy in Philippines where maritime logistics are a vital transport way in light of composing of numerous islands. The country is required an impellent action to refine some of the existing factors for more efficient & robust safety policy as it presently marked as one of the largest sea casualty places in the world even if the economic growth is getting increased remarkably. This study used the Cross Tabulation Analysis as methodology to analyse the data obtained through questionnaires designed on the deterrent factors existing in such each policy governing bodies as Maritime Industry Authority, Philippine Port Authority and Philippine Coast Guard, etc., and according to the overall analysis, the factors of law & institutional Systems, Government Support. IT Systems, Navigation Safety Systems and Infrastructures have been demonstrated as most compellent improvement factors.

Key words : Coastal shipping, Safety policy, Philippines coast guard, Navigation safety systems

Ⅰ. Introduction

Coastal Shipping is an vital part in a country's domestic inter-port & transport services. Considering a geographical setting of the Philippines, the coastal shipping provides a primary means of inter-island transport as the volume of domestic trade is getting increased especially in the southern part of the country, which is largely dependent on the sea logistics. Philippines, a country located in the Western Pacific Ocean, consists of more than 7,000 islands with a coastline of 36,289 km and 821 commercial ports, etc.

Philippines is divided under three main geographical divisions from north to south: Luzon, Vizayas and Mindanao, and it has been long-run recognized itself as an archipelagic and a maritime nation. As a maritime nation, the interest in the sea of the Philippines would be in the fields of shipping and commerce, navigation, and naval affairs including the contribution of its maritime industry to the international maritime economy. Thus, an archipelagic and maritime approach for the Philippines encompasses both inward and outward looking perspectives in protecting its

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interests. According to the latest statistics year 2018, domestic sea trades accounted for about almost all or 99.9% of the commodities were carried through coastwise water while a bit part of remaining commodities through air. The country, however, has been marked as one of the dishonorable countries on the safety area at sea in the world. There have been numerous sea casualties in the Philippines. For the purpose of accomplishing the research goal, this study attempts to identify the essential factors that affect the domestic coastal shipping safety policy in the country, and holistically categorized researching items into law & institutional systems, IT systems, government supports, navigation safety and infrastructures, etc. under references of literature studies.

Ⅱ. Literature Review

References were made for the previous studies in order to extract factors contributing to the researching objectives. According to the paper "a proactive approach for maritime safety policy making for the Gulf of Finland: Seeking best practices"(Haapasaari, et, al., 2015), a governance framework can improve safety by focusing on actual regional risks, designing tailor-made safety measures to control them, enhancing a positive safety culture in the shipping industry, and by increasing trust among all involved. The paper "a STAMP-based approach for designing maritime safety management systems"(Osiris, Bandaa & Goerlandta, 2018) pointed out a safety system engineering process for designing maritime safety management systems. The paper "safety culture assessment and implementation framework to enhance maritime safety"(Arslan, et. al., 2016) suggested developing a safety culture assessment tool which covers all of the safety related aspects in a shipping company and measures will be taken pro-actively and reactively in order to enhance safety of the shipping industry. The study on "the role and importance of safety in Maritime transportation"(Galic, et. al., 2014) researched the flow and the analysis of the development of technologies that have been major milestones in shipping with regard to their contribution to maritime safety. Lee et al.(2018) suggested individual's competency, job satisfaction, job involvement and job performance on ship-repair workers are essential factors for the ship's safety maintenance. The paper "Enhancement of maritime safety in the Philippines"(Badajos, 1999) studied to determine the need for the improvement of maritime safety in the Philippines through the establishment and maintenance of lighthouses and other aids to navigation and examine the current level of implementation of the maritime safety improvement projects. The study on "the effectiveness of maritime safety policy instruments from the Finnish maritime experts' point of view – case Gulf of Finland and prevention of an oil accident"(Lappalainen, et. al., 2013) presented the findings of a questionnaire analysis that was targeted at Finnish maritime experts and addressed the question: how to prevent an oil accident in the Gulf of Finland. The research showed that many kinds of policies have improved maritime safety, With references to the previous researches as above, It would be summarized that shipping companies in the Philippines are also required to actively promote the maritime safety with their self-participation for the sake of reducing & lessening an inherent sea casualties. Baek et al.(2018) pointed out the teamwork & leadership

education of seafarers are a vital factors for the ship's safety at sea.

Ⅲ. General Status of Safety Policy in the Philippines

<Table 1> shows various type of sea casualty has happened in Philippines. Out of them, the causes of engine trouble, capsize & aground are most prominent mainly due to the over-aged & small-sized vessels, including lack of aids to navigations & other inefficient safety management systems, etc.

<Table 1> Maritime Accidents in Philippines

Type	Number of vessel				
	2013	2014	2015	2016	2017
Aground	69	97	71	81	56
Sunk	45	61	31	40	11
Collision	21	18	43	15	20
Fire	9	11	7	17	24
Capsize	80	75	56	61	124
Missing	27	59	31	51	91
Engine	161	184	123	122	215
Flooding	6	4	2	0	0
Rammed	35	17	21	18	39
Others	22	43	24	48	7
Total	475	569	409	453	587

Source: Philippine Coast Guard & Maritime Industry Authority

In philippines, there are several bodies to rule over the vessel safety. As one of the first government agencies established under the Malolos Constitution on January 21, 1899, the DOTr plays a crucial role in accelerating the country's transport infrastructure systems.

Maritime Industry Authority(MARINA) has a power and authority to inspect all vessels to ensure and enforce compliance by every domestic ship operator with required safety standards & rules and regulations on vessel safely. Philippine Ports Authority(PPA) is in-charge of the planning, development, financing and operation of ports or port districts for the entire country. Philippine Coast Guard(PCG) is mandated to enforce laws or assist in the enforcement of all applicable laws upon the high seas and waters subject to the jurisdiction of the country.

1. Ship's Inspections

Ship Inspection is an important role in assessing the condition of the vessel & its equipments and ensuring them to be complied with the requirements of the international regulations. Vessels which did not pass the necessary requirements are considered unseaworthy. Philippine registered vessels should comply with the rules & regulations under governance of MARINA, and if the inspections to satisfy were failed, corresponding fines & penalties are levied as appropriate.

2. Issuance of Certificate by Regulations

Marina STCW Circular No. 2018-05 discusses the Rules in the Issuance and Revalidation of Certificate of Proficiency(COP) for Basic Training, Proficiency in Survival Craft and Rescue Boats other than Fast Rescue Boats, Advance Fire Fighting, Medical First Aid, Medical Care, Ship Security Officer and Security-Awareness Training & Seafarers with Designated Security Duties Under Chapter VI of the STCW Convention, 1978, as Amended.

3. Management of Aids to Navigation

Aids to Navigation(AtoN) are all man-made objects used by mariners to determine ship's

position or a safe course. These aids also assist mariners in making a safe landfall, mark isolated dangers, enable pilots to follow channels, and provide a continuous chain of charted marks for precise piloting in coastal waters. The term "aids to navigation" includes buoys, day beacons, lights, lightships, radio beacons, fog signals, marks and other devices used to provide "street" signs on the water. Aids to Navigation include all the visible, audible and electronic symbols that are established by government and private authorities for piloting purposes. Philippines' Aids to Navigation(AtoN) facilities were reported that only 72.73% of lighthouses and 68.22% of lighted buoys are operating.

4. Traffic Management System

Vessel Traffic Management System(VTMS) is a nautical vessel movement observing system established by harbor or port authorities. According to TRANSAS (2014), the VTMS system utilizes information collected by advanced sensors, for example, radar, AIS, closed-circuit television(CCTV), Meteo-Hydro and other electronic object detection systems. The primary purpose of VTMS is to improve the safety and efficiency of navigation, improve features of port services, protection of life at sea and the safeguard marine environment. In Philippines, the VTMS is being partly operated at Manila Bay, Batangas City, Cebu City, Cagayan De Oro and Corregidor Island. The VTMS in Batangas was the first of its kind in the Philippines initiated, implemented and Operated by the Philippine Ports Authority(PPA). VTMS Cebu which is composed of VTMS Control Center and three Radar Stations strategically located at Headquarters Coast Guard District Central Visayas, Talisay, Bantalinao, and Interbridge to have full coverage of vessel movements and to prevent maritime traffic along Cebu-Mactan Channel. Such Infrastructures as navigation & VTMS facilities in the country, however, is absolutely not enough comparing to the wide range of coastwise lines & channels, etc.

Ⅳ. Empirical Analysis

1. Questionnaires

A questionnaires in a 7-point Likert scale format test were used to determine the overall effectiveness of the maritime policy in the Philippines. The survey was conducted in the National Capital Region in Philippines, specifically in Metro Manila during the period of October to December 2018. The respondents include employees of Seafarers, Shipping Companies and Training Centers, MARINA, Philippine Coast Guard & Philippine Ports Authority respectively. <Table 2 & 3> show the total respondents as per the positions & each organizations participated in this survey.

<Table 2> Summary of Respondents by Position

Respondents	C	TM	GM	D
200	27	73	50	50

Note: C: Clerk, TM: Team Manager, GM: General Manager, D: Director

<Table 3> Summary of Respondents by Organization

Respondents	MARINA	PCG	PPA	SCTC	Seafarer
200	42	41	41	34	42

Note: SC: Shipping Company, TC: Training Center

2. Methodology

This study used cross tabulation as statistical tool to analyze the data of questionnaires that had been gathered.

Cross tabulation method also known as contingency table analysis is most often used to analyze categorical(nominal measurement scale) data, and it is a two or more dimensional tables that records the number(frequency) of respondents that have the specific characteristics described in the cells of the table. It also provides a wealth of information about the relationship between the variables. In order to test the statistical significance of the cross tabulation, chi-square statistic is used.

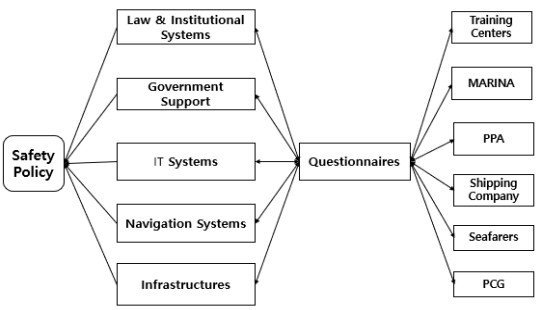
The Chi-Square statistic is most commonly used to evaluate tests of independence when using a cross tabulation also known as a bivariate table. Cross tabulation presents the distributions of two categorical variables simultaneously with the intersections of the categories of the variables appearing in the cells of the table.

The test of independence assesses whether an association exists between the two variables by comparing the observed pattern of responses in the cells to the pattern that would be expected if the variables were truly independent of each other. Calculating the Chi-Square statistic and comparing it against a critical value from the Chi-Square distribution allows the researcher to assess whether the observed cell counts are significantly different from the expected cell counts.

As depicted in the formula, the Chi-Square statistic is based on the difference between what is actually observed in the data and what would be expected if there was truly no relationship between the variables.

3. Analysis Model

The purpose of establishing this model is to closely examine the factors that affect the maritime safety policy which is a major independent factor. This study model has five dependent variable factors that have an impact in the quality of service in the maritime safety. The five major dependent variables have been measured through questionnaire surveys under itemized as law and institutional systems, government support, IT systems, navigation systems and infrastructures. If the dependent factors were higher, the value of the independent factors would improve as well. These improvements will result in higher performance and service, and will lead to the enhancement of safety in coastal shipping.



[Fig. 1] Analysis Model

4. Analysis Result

The data analysis focused on the positions or job titles of correspondents belonging to each organizations involved in the safety and specified variable factors has been made by using the software SPSS 21.0 and the questionnaires following a 7-point Likert scale were formated as 1 Strongly agree, 2 Agree, 3 More or less agree, 4 Normal, 5 More or less disagree, 6 Disagree & 7 Strongly disagree respectively.

<Table 4> law & Institutional Systems of the international standards

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	2	0	0	2	4	
	Pct	1.0	0.0	0.0	1.0	2.0	
2	Frq	1	0	1	0	2	
	Pct	.5	0.0	.5	0.0	1.0	
3	Frq	2	3	1	1	7	
	Pct	1.0	1.5	.5	.5	3.5	
4	Frq	9	19	11	11	50	
	Pct	4.5	9.5	5.5	5.5	25.0	21.11
5	Frq	6	20	11	9	46	(.027)
	Pct	3.0	10.0	5.5	4.5	23.0	
6	Frq	3	17	18	15	53	
	Pct	1.5	8.5	9.0	7.5	26.5	
7	Frq	4	14	8	12	38	
	Pct	2.0	7.0	4.0	6.0	19.0	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 4> presents only 6.50% higher scale than normal level were responded positively while 68.50% showed negative especially by manager & director titles at 17.13 of χ^2 on the significance level 0.027**, which means the present systems are largely insufficient for international standards. Therefore, the systems are needed to be more modified in accordance with international requirements for improving safety.

<Table 5> presents only 6.50% higher scale than normal level were responded positively while 70.50% showed negative 26.50% disagree & 23.5% strongly disagree especially by manger & director titles at 18.23 of χ^2 on the significance level 0.041**, which means the present safety inspection systems are not managed in proper way.

<Table 6> presents only 9.50% higher scale than normal level were responded positively while 68.50% showed negative including 22.50% disagree & 19.50% strongly disagree especially by manager & director titles at 11.90 of χ^2 on the significance level 0.052**, which means the navigation safety information is not properly distributed by the government, whereby the navigating ships are to be often in dangerous situations at sea.

<Table 5> Ship's safety inspections are being carried out in accordance with a proper way & manner

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	2	2	1	2	7	
	Pct	1.0	1.0	.5	1.0	3.5	
2	Frq	1	1	1	0	3	
	Pct	.5	.5	.5	0.0	1.5	
3	Frq	1	1	1	0	3	
	Pct	.5	.5	.5	0.0	1.5	
4	Frq	5	18	17	6	46	
	Pct	2.5	9.0	8.5	3.0	23.0	18.23
5	Frq	7	18	7	9	41	(.041)
	Pct	3.5	9.0	3.5	4.5	20.5	
6	Frq	5	17	15	16	53	
	Pct	2.5	8.5	7.5	8.0	26.5	
7	Frq	6	16	8	17	47	
	Pct	3.0	8.0	4.0	8.5	23.5	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 6> Distribution of Notice of Mariners to the Navigators

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	0	3	2	2	7	
	Pct	0.0	1.5	1.0	1.0	3.5	
2	Frq	1	4	3	1	9	
	Pct	.5	2.0	1.5	.5	4.5	
3	Frq	0	1	1	0	2	
	Pct	0.0	.5	.5	0.0	1.0	
4	Frq	6	16	16	7	45	
	Pct	3.0	8.0	8.0	3.5	22.5	11.90
5	Frq	6	22	10	15	53	(.052)
	Pct	3.0	11.0	5.0	7.5	26.5	
6	Frq	7	15	11	12	45	
	Pct	3.5	7.5	5.5	6.0	22.5	
7	Frq	7	12	7	13	39	
	Pct	3.5	6.0	3.5	6.5	19.5	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 7> Navigation route management & supervision by government

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	0	1	2	2	5	
	Pct	0.0	.5	1.0	1.0	2.5	
2	Frq	1	1	1	0	3	
	Pct	.5	.5	.5	0.0	1.5	
3	Frq	0	4	4	1	9	
	Pct	0.0	2.0	2.0	.5	4.5	
4	Frq	10	26	15	15	66	
	Pct	5.0	13.0	7.5	7.5	33.0	
5	Frq	8	19	12	15	54	10.34
	Pct	4.0	9.5	6.0	7.5	27.0	(.020)
6	Frq	7	14	11	10	42	
	Pct	3.5	7.0	5.5	5.0	21.0	
7	Frq	1	8	5	7	21	
	Pct	.5	4.0	2.5	3.5	10.5	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 7> presents only 8.50% higher scale than normal level were responded positively while 58.50% showed negative including 21% disagree & 10% strongly disagree at 10.34 of χ^2 on the significance level 0.020**, which means the domestic navigation routes should be managed with proper traffic facilities to secure ship's safety.

<Table 8> presents only 13% higher scale than normal level were responded positively while 66% showed negative including 26% disagree & 11.50% strongly disagree especially by manager & director titles at 21.37 of χ^2 on the significance level 0.021**, which means the government is needed to design an efficient navigation warning and information systems for the safety improvement.

<Table 9> presents only 19% higher scale than normal level were responded positively while 50% showed negative including 16 % disagree & 9.50% strongly disagree especially by manager titles at 20.18 of χ^2 on the significance level 0.032**, which means the government is needed to establish

<Table 8> Access to useful navigation information

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	1	1	4	0	6	
	Pct	.5	.5	2.0	0.0	3.0	
2	Frq	1	1	2	1	5	
	Pct	.5	.5	1.0	.5	2.5	
3	Frq	2	7	1	3	13	
	Pct	1.0	3.5	.5	1.5	6.5	
4	Frq	6	18	10	10	44	
	Pct	3.0	9.0	5.0	5.0	22.0	21.37
5	Frq	5	27	11	14	57	(.021)
	Pct	2.5	13.5	5.5	7.0	28.5	
6	Frq	10	10	16	16	52	
	Pct	5.0	5.0	8.0	8.0	26.0	
7	Frq	2	9	6	6	23	
	Pct	1.0	4.5	3.0	3.0	11.5	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 9> IT systems for vessel entry & departure procedures

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Fra	3	4	4	1	12	
	Pct	1.5	2.0	2.0	.5	6.0	
2	Frq	2	4	2	1	9	
	Pct	1.0	2.0	1.0	.5	4.5	
3	Frq	1	10	5	1	17	
	Pct	.5	5.0	2.5	.5	8.5	
4	Frq	8	22	15	17	62	
	Pct	4.0	11.0	7.5	8.5	31.0	20.18
5	Frq	5	18	9	17	49	(.032)
	Pct	2.5	9.0	4.5	8.5	24.5	
6	Frq	5	10	12	5	32	
	Pct	2.5	5.0	6.0	2.5	16.0	
7	Frq	3	5	3	8	19	
	Pct	1.5	2.5	1.5	4.0	9.5	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

IT-based port administration similar to the PORT-MIS system in Korea in order to integrate all the port-related administrative procedures based on port management information system.

<Table 10> Government budget for maritime safety

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	2	2	2	2	8	
	Pct	1.0	1.0	1.0	1.0	4.0	
2	Frq	3	6	5	3	17	
	Pct	1.5	3.0	2.5	1.5	8.5	
3	Frq	4	9	9	4	26	
	Pct	2.0	4.5	4.5	2.0	13.0	
4	Frq	2	22	10	12	46	
	Pct	1.0	11.0	5.0	6.0	23.0	15.50
5	Frq	10	21	12	20	63	(.070)
	Pct	5.0	10.5	6.0	10	31.5	
6	Frq	3	9	8	6	26	
	Pct	1.5	4.5	4.0	3.0	13.0	
7	Frq	3	4	3	3	13	
	Pct	1.5	2.0	1.5	1.5	6.5	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25	25	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 10> presents only 25.50% higher scale than normal level were responded positively while 51% showed negative at 15.50 of χ^2 on the significance level 0.070*, which means the government is needed to provide more budget to secure the safety improvement.

<Table 11> The government financing subsidy for new building vessels

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	3	2	0	2	7	
	Pct	1.5	1.0	0.0	1.0	3.5	
2	Frq	3	18	12	5	38	
	Pct	1.5	9.0	6.0	2.5	19.0	
4	Frq	3	11	7	15	36	
	Pct	1.5	5.5	3.5	7.5	18.0	
4	Frq	5	22	14	5	46	
	Pct	2.5	11.0	7.0	2.5	23.0	30.21
5	Frq	6	10	9	16	41	(.035)
	Pct	3.0	5.0	4.5	8.0	20.5	
6	Frq	4	5	5	4	18	
	Pct	2.0	2.5	2.5	2.0	9.0	
7	Frq	3	5	3	3	14	
	Pct	1.5	2.5	1.5	1.5	7.0	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 11> presents 40.50% higher scale than normal level were responded positively while 36.50% showed negative at 30.21 of χ^2 on the significance level 0.035**, which means the subsidy policy for new building ships is keeping almost normal level comparing to other industry.

<Table 12> The government supporting on budget for coastal shipping

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	0	4	1	2	7	
	Pct	0.0	2.0	.5	1.0	3.5	
2	Frq	3	7	8	5	23	
	Pct	1.5	3.5	4.0	2.5	11.5	
3	Frq	6	16	10	11	43	
	Pct	3.0	8.0	5.0	5.5	21.5	
4	Frq	7	27	18	12	64	
	Pct	3.5	13.5	9.0	6.0	32.0	18.16
5	Frq	2	10	3	12	27	(.044)
	Pct	1.0	5.0	1.5	6.0	13.5	
6	Frq	6	6	6	4	22	
	Pct	3.0	3.0	3.0	2.0	11.0	
7	Frq	3	3	4	4	14	
	Pct	1.5	1.5	2.0	2.0	7.0	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25.0	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 12> presents only 36.50% higher scale than normal level were responded positively while 31.50% showed negative including 11% disagrees at 18.16 of χ^2 on the significance level 0.044**, which means the government is needed to support more budget to the coastal shipping activation and safety improvement.

<Table 13> presents only 27.50% higher scale than normal level were responded positively while 47.50% showed negative including 21.50% disagree at 20.46 of χ^2 on the significance level 0.007***, which means the government is needed to invest more such aids to navigation as lighthouses & buoys, etc. in order to achieve the safety improvement purpose.

<Table 13> Aids to Navigation facilities

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	1	8	2	3	14	
	Pct	.5	4.0	1.0	1.5	7.0	
2	Frq	4	8	5	3	20	
	Pct	2.0	4.0	2.5	1.5	10.0	
3	Frq	4	5	8	4	21	
	Pct	2.0	2.5	4.0	2.0	10.5	
4	Frq	3	21	12	13	49	
	Pct	1.5	10	6.0	6.5	24.5	
5	Frq	5	12	11	10	38	15.23
	Pct	2.5	6.0	5.5	5.0	19.0	(.811)
6	Frq	7	15	9	12	43	
	Pct	3.5	7.5	4.5	6.0	21.5	
7	Frq	3	4	3	4	14	
	Pct	1.5	2.0	1.5	2.0	7.0	
Total	Frq	27	73	50	50	200	
	Pct	13	36	25	30	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 14> Sea traffic management systems

Scale		C	TM	GM	D	Ttl	χ^2(p)
1	Frq	1	4	7	1	13	
	Pct	.5	2.0	3.5	.5	6.5	
2	Frq	2	9	6	2	19	
	Pct	1.0	4.5	3.0	1.0	9.5	
3	Frq	5	5	3	5	18	
	Pct	2.5	2.5	1.5	2.5	9.0	
4	Frq	6	23	11	15	55	
	Pct	3.0	11.5	5.5	7.5	27.5	17.72
5	Frq	5	13	11	8	37	(.047)
	Pct	2.5	6.5	5.5	4.0	18.5	
6	Frq	5	13	10	14	42	
	Pct	2.5	6.5	5.0	7.0	21.0	
7	Frq	3	6	2	5	16	
	Pct	1.5	3.0	1.0	2.5	8.0	
Total	Frq	27	73	50	50	200	
	Pct	13.5	36.5	25.0	25	100%	

Significance: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^{*}$

<Table 14> presents only 25% higher scale than normal level were responded positively while 47.50% showed negative including 21% disagree at 17.72 of χ^2 on the significant level 0.047**, which means the government is needed to provide more such sea traffic management infrastructures as VTS or VTM at the area of heavy traffic navigational channels to improve the safety since the VTS/VTM systems are being operated only in a few area including Manila, Batangas and Cebu.

Ⅴ. Conclusion

According to this research, a most recommendable & prioritize factors to improve maritime safety are itemized as bellow. The present law & institutional systems should be designed and supplemented for more users' demand views, and the systems are needed to be more modified in accordance with international requirements for improving safety.

The ship's inspection systems which carried out by six private firms accredited from MARINA without any domestic class society are also considered to be supplemented in more modernized manner for safety improvement. Further, the government is needed to take a more developed technical policy on the maritime information system to prevent ship's accident, and the domestic navigation routes should be managed with proper traffic facilities to secure ship's safety.

The shipping companies are also inconvenient to get in touch with navigation equipment providers. Therefore the government is needed to activate the market service of navigation equipments for the users to access easily. the government is also needed to design an efficient navigation warning and information systems for the safety improvement.

The government is required to establish IT-based port administration similar to the PORT-MIS system in Korea in order to integrate all the port-related administrative procedures based on port management information system. the on-line port management &

information systems are required to improve safety.

The government is needed to provide more budget to secure the safety improvement. the subsidy policy for new building ships is keeping almost no differential level comparing to other industry. The bank loan assistance is also not satisfactory for the users since most of the bank loan interest is very high comparing to the developed countries. and the government is needed to design more efficient administration service in favor of the users by minimizing the import duties, etc.

The government is also requested to remove more restrictions on importing vessels from oversea's countries so as to help the vessels modernized as newly as possible for the safety improvement.

Meanwhile, the government is needed to invest more such navigational infrastructures as lighthouses & buoys, etc. including VTS or VTM at the area of heavy traffic navigational channels with special budget assistance to improve the safety.

References

Arslan V, Kurt RM, Turan O and Wolff LD(2016). Safety culture assessment and implementation framework to enhance maritime safety. Transportation Research Procedia, 14, 3895~3904

Badajos JB(1999). Enhancement of maritime safety in the Philippines. The Maritime Commons: Digital Repository of the World Maritime University, 23~37.

Baek IH, Kim mj and Yoon DG(2018). A Study on the Safety Effect of Leadership & Teamwork Education by Application to the Coastal Passenger Seafarers in Korea, The Journal of Fisheries & Mariner Sciences Education 36(5), 1802. https://doi.org/10.13000/JFMSE.2018.10.30.5.1802

Galic S, Lusiz Z and Skoko I(2014). The role and importance of safety in Maritime Transportation. 6th International Maritime Science Conference, April 28th-29th, Solin, Croatia, 186~200.

Haapasaari P, Helle I, Lehikoinen A, Lappalainen J and Kuikka S(2015). A proactive approach for maritime safety policy making for the Gulf of Finland: Seeking best practices. Marine Policy, 60, 107~118.

Lappalainen J, Storgård J and Tapaninen U(2013). The effectiveness of maritime safety policy instruments from the Finnish maritime experts' point of view-case Gulf of Finland and prevention of an oil accident. The International Journal on Marine Navigation and Safety of Sea Transportation, 7(3), 353~362.

Lee GT, Baek IH and Park JU(2018). The Study about Individual's Competency, Job Satisfaction, Job Involvement and Job Performance on Ship-Repair Workers. The Journal of Fisheries and Mariner Sciences Education 30(2), 546. https://doi.org/10.13000/JFMSE.2018.04.30.2.542

Osiris A, Bandaa V and Goerlandta F(2018). A STAMP-based approach for designing maritime safety management systems. Safety Science, 109, 109-129

www.coastguard.gov.ph

www.dotr.gov.ph

www.marina.gov.ph

www.ppa.com.ph

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