

A Study on the Development of Fishing Vessels Safety Technology in Aceh Province of Indonesia for Korea's ODA

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한국의 공적원조를 위한 인도네시아 아체 지역의 어선 안전기술의 개발에 관한 연구

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Abstract : Korea has recently joined the Development Assistance Committee (DAC) and currently implements a policy of vastly expanding the size of ODA. Indonesia has highly possessed growth potential in terms of vast quantity of natural resources, cheap labor force, and large local markets. Researches on how to support the Special Territory of Aceh province were made in this study. There is a necessity to increase the capacity of matter to the fishermen, and support facilities and infrastructure assistance to support the safety system in the sea.

Key Words : Official Development Assistance (ODA), Aceh province, Indonesia, Fishing vessel, Safety

요 약 : 우리나라는 최근 대개도국 지원국가(DAC)에 가입하여 공적원조(ODA)의 규모를 확대하고 있다. 인도네시아는 많은 부존자원과 값싼 노동력, 큰 현지시장을 갖고 있어 큰 잠재 성장력을 갖고 있다. 특히 인도네시아의 특별자치주인 아체지역은 쓰나미로 인해 큰 피해를 입었으며, 역사적으로도 많은 어려움을 겪은 지역이어서 우리나라의 원조를 희망하고 있다. 본 연구에서는 아체지역에서 필요로 하는 어선 안전에 관한 시스템과 설비 및 인프라에 대해 기술하고 이 지역에 대한 효과적인 개발 및 지원 방안을 제시하였다.

핵심용어 : 공적원조, 아체주, 인도네시아, 어선, 안전

1. Introduction

Governments around the world have tried to strengthen relationships with countries of high growth potential. For that purpose, they have expanded trades and investments in such countries and also offered Official Development Assistance(ODA) programs. Korea recently joined the Development Assistance Committee(DAC) and currently implements a policy of vastly expanding the size of ODA from 0.09% of Gross National Income(GNI), ODA/GNI rate, in 2008 to 0.25% in 2015 as shown in Table 1(Kim, 2010).

Indonesia, the subject of this study, has been a major target of economic cooperation by advanced countries. Korea, recognized the growth potential of Indonesia,

Table 1. The road map for Korea's ODA

2008		2010		2012		2015
Emerging donor	→	OECD/DAC member	→	Improving ODA system	→	Being a advanced donor
ODA/GNI rate 0.09%		ODA/GNI rate 0.13%		ODA/GNI rate 0.15%		ODA/GNI rate 0.25%
* Grant share enhancement * Untied rate enhancement * Program based Approach * Aid effectiveness improvement * Public support increase				→	* Global Korea supported by Korean and World Citizen	

Source: Kim(2010), Korea's ODA and KOICA

designated the country as a priority support country and provide credit assistances or grant-type aids to strengthen

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its relationship with Indonesia. However, the size of economic assistance of Korea has been very small compared to other advanced countries and the assistance programs have not been implemented in a systematic and strategy way (Kim, 1995).

In this context, the study selected Indonesia as a priority development country as we held several international seminars and site surveys in connection with ODA programs, and Indonesia has highly assessed growth potential in terms of vast quantity of natural resources, cheap labor force, and large local markets.

Especially, the special territory of Aceh lost almost all of its infrastructure in maritime and fishery business owing to the 2005 tsunami, and the assistance in the fishery industry, the primary industry of Aceh, is very urgent. We found that the Aceh government wishes to get transfer of techniques and technologies on fishery and fishing boat safety; therefore, it is necessary for us to study and develop techniques and technologies to be offered.

Accordingly, in this study, we made researches on how to support the special territory of Aceh which has not received sufficient support from foreign countries yet owing to regional and political difficulties, even though it is very rich in natural resources even in Indonesia.

First of all, we studied general distribution of fishery resources and the status of fishing technologies and safety concerns of fishing boats to find out techniques and technologies on fishery and fishing boat safety, the most urgent requirement for Aceh province of Indonesia.

2. Circumstances of Aceh marine and fisheries

2.1 Preface

Aceh is a province with special autonomy as stipulated in the Law of the Republic of Indonesia No.18 Year 2001 and No.11 year 2006 about the government of Aceh. Referring to the both laws, Aceh has special policies in driving and developing the wheels of government and development within the unitary republic of Indonesia.

Geographically, Aceh province has strategically region that gave more advantages role as main gate international commerce, especially in South-East Asia and Australia and also covered by Malacca Straits and Sumatera Utara Province in the East-North Coast.

The land of Aceh area reach of 57,365.57 km² or 5,736,557 ha, its has coastal line of 1,660 km with coastal area of 295,370 km, consist of sea territory and coastal land territory

of 56,563 km² and 238,807 km of Exclusive Economic Zone. This region also consists of big and small islands about 180 islands. Among of the islands, 44 islands have citizens and 136 islands have no citizens. On the other hand, Aceh has 73 important rivers that flow to estuary, which has caused this province as one of important region with a great potency in marine and fishery sector.

Generally, exploitation of Aceh marine and fisheries is untapped maximally by fishermen. This circumstances can be influenced by various factors related to fishing activities both of technically or economically in terms of exploring the widely sea of Aceh. From safety fishing aspect view, Aceh fishermen unrealized of important safety fishing reason as a primary priority in operating fishing fleet on the sea.

Furthermore, lack of awareness of the issues makes fishermen go to the sea without understanding of symbols and instruments of salvation and the importance of fishing safety.

2.2 Potency of Aceh marine and fisheries

Through its position which is closed to north Sumatra province, mostly surrounding area by the sea, Aceh territory influenced by the junction waves of Indian Ocean, Malacca Strait, South China Sea interacted to Sumatra Island, Malacca Peninsula, Andaman and Nicobar Islands that enriched the Aceh sea by specific marine ecosystems. In addition, it is a big potency unexploited optimally.

The primary commodities in Aceh coastal area are such as tuna (Tunnus), skipjack tuna, and little tuna. Meanwhile, the Aceh fishermen still using small fleets in fishing activities and less of fishing ground about 12 miles. Whereas, up to 12 miles, utilized by large fishing fleets this sized up to 30GT.

Fishing fleets as an important part to support fish capture process on the sea and Aceh has difference form and type of fishing fleets. The difference varies among districts levels depending on culture and environmental characteristic. The sizes consist of the capacity level of fish loading place on fishing vessels, classified on following:

- 1) Capacity < 5GT
- 2) Capacity 5GT ~ 10GT
- 3) Capacity 10GT ~ 30GT
- 4) Capacity > 30GT

The capacity loading level increasing each year, especially on coastal east Aceh, it can be seen on figure 1 below:

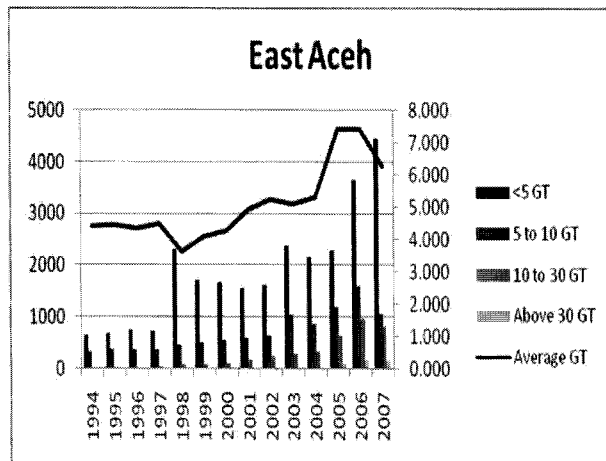


Fig. 1. Fishing fleet growth charts.

At the moment, the number of fishermen in Aceh province counted as 61,768 where 58% is fully works as fishermen, whereas 42% as subsistence. Table 2 showed the number of fishermen distributed around each districts and cities (Marine and Fisheries Agency of Aceh, 2009), as follows:

Table 2. The number of Aceh fishermen (Unit : persons)

Districts / Cities	Total	Fishermen categories	
		Full	Subsistence
Sub total (West coast)	22,629	17,103	5,526
Aceh Selatan	7,414	5,882	1,532
Aceh Singkil	2,761	1,485	1,276
Aceh Barat	1,662	1,080	582
Simeulue	3,251	2,676	575
Aceh Besar	1,354	997	357
Aceh Jaya	802	492	310
Nagan Raya	1,270	1,083	187
Abdya	3,297	2,827	470
Sabang	818	581	237
Sub Total (East-North)	39,139	18,634	20,505
Pidie & Pijay	2,900	1,274	1,626
Bireun	9,121	2,165	6,956
Lhokseumawe	790	790	0
Aceh Utara	5,222	2,525	2,697
Aceh Timur	8,290	1,679	6,611
Langsa	4,388	3,314	1,074
Tamiang	7,051	5,741	1,310
Banda Aceh	1,377	1,146	231
Total	61,768	35,737	26,031

* Source : Marine and Fisheries Agency of Aceh

Aceh sea territory has high economics resources with potency of preservation estimated about 272,707 tones per year. Fish production has increased in average for certain

economics commodities every year. Nowadays, the north an east coastal area of Aceh has been exploited optimally, yet, the west and south still unexplored maximally. It is because the southwest Aceh is using small fishing vessels, meanwhile the northeast has already used large fishing vessels, sized more than 30GT, that could explore fishing ground far away.

There are some fish types distributed in Aceh sea area, consist of many species which has high economics potential for export quality. Table 3 showed the types of fish landing on fishing port in Aceh.

Table 3. Types of landing fish in Aceh (Unit : Tons)

No	Fish Types	2004	2005	2006	2007	2008	Information
1	Tuna *)	2,467.0	3,360.5	2,385.3	6,096.4	8,168.3	Economically important fish species *)Export Commodities
2	Marlin *)	2,269.0	964.8	2,000.7	2,678.7	2,488.1	
3	Little tuna	9,349.6	7,380.8	9,167.6	12,882.0	23,680.8	
4	Skipjack	6,512.3	5,791.0	8,900.5	9,199.2	8,450.6	
5	Jack trevalies *)	2,206.3	2,231.8	3,417.7	5,258.6	4,609.4	
6	Snapper	1,304.7	1,026.6	2,374.0	2,172.9	1,005.6	
7	Silver pomfret *)	304.8	83.5	121.8	753.6	668.3	
8	Black pomfret *)	952.7	1,601.4	2,162.0	911.2	502.4	
9	King mackarel *)	3,906.2	3,701.0	5,977.8	2,701.2	2,328.7	
10	Anchovies	6,165.1	2,355.0	4,139.4	3,334.0	4,223.2	
11	Stingray *)	950.9	395.3	991.8	1,554.1	1,137.0	
12	Grouper *)	1,784.0	1,175.4	1,622.0	2,205.4	1,869.1	
13	Mackarel*)	4,906.9	6,026.9	8,864.4	7,612.0	7,413.3	
14	Lobster *)	557.8	123.0	179.1	292.1	40.5	
15	Keputing /Rajungan *)	37.0	48.5	64.7	89.7	56.9	

* Sources : Marine and Fisheries Agency of Aceh, 2009

2.3 Unstandardized safety of fishing vessel in Aceh province

Safety fishing vessels is unstandardized in Aceh, and this is important issue. It needs such an effort from each stakeholder due to this activity that has high safety risk on the sea because of extreme environments. Indonesian Maritime Council(IMC) said that 72% from 1,551 cases of casualties occurred due to human error.

From the research of IMC above, there are five factors contributed to casualties in fishing activity, i.e.: captain and fleet official(80.9%), fleet owner(8.7%), harbour master(1.8%), classification board(3.1%), and fishing operational(5.5%). First semester of 2005, fleet casualties increased significantly to 26 cases and others unreported.

Since 1982~2000, 3,826 cases of casualties occurred or 204 cases in average each year. It means that every 2 days, the casualties happened once. Nevertheless, statistic fleet accident showed that the average of cases in 1998, 1999 and 2000 shows declining trend, to 64 cases per year, or 1 case every 5 days.

In general, fishing vessels have characteristics that are not much different from other types of vessel. The difference lies in its function. Fishing vessels according to their function can be differentiated into:

- 1) Fishing Vessel
- 2) Transporting fish caught and processing fishery product vessel
- 3) Research and training fishing vessel

The fishing ship which will be discussed here is a function of fishing vessels to catch fish only in Aceh. A form of fishing vessel today is basically a combination of good resistance with a good quality of sea worthiness. Fishing boat in accordance with its function to catch the fish has special characteristics to support its operation.

Broadly speaking we can say that fishing boat in production at the shipyard - the traditional shipyard Aceh province, does not refer to the rules of regulation and classification of existing ships, thus to the occurrence of accidents in the sea is very high.

The cause of the accident of fishing vessel can be broken down by caused of human error, caused by natural disasters (force major) and due to the structure of the ship(hull structure).

Identify sources of hazard(hazard source identification)is to fulfill the safety requirements exist and can be done by dividing the fishing vessel is based on 2 parts:

- 1) Hazard Area
- 2) Dangerous Action

Explanations are as follows:

- 1) Hazard Area, divided into 2 parts:
 - a. Working Area such as deck, wheelhouse, engine room
 - b. Accommodation room

Both of 2 areas are used for various activities ranging from operating activities and non-operational activities, the distribution area on a fishing vessel can not be done specifically because the field is in fact the area has no clear boundaries. It can be seen on the table 4 and 5 below:

Table 4. Hazard area on working area

Power	Equipment	Liquid material	Fishing gears
- Electricity	- Vessel machinery	- Fuel	- Net
- Mechanical	- Helping machine	- Lubricant	- Fishing equipment
- Thermal	- Electrical system	- Chemical	- Hook
	- Radio communication system		- Rope
	- Fuel system		
	- Safety equipment		

Table 5. Hazard identification of working area

Navigation	Stabilities	Fire	Leakage	Sign equipment
- Communication radio	- Capacity of fuel tank	- Active fire equipment	- Watertight bulkhead	- Flagman emergency tool
- Compass	- Capacity of water tank	- Machine room and storage locations for Battery	- Raft/buoy	
	- Loading tool			
	- Fishing tool			

2) Dangerous action

Based on monitoring results of activities that may cause danger to the operation of fishing vessels in Aceh, it previously described types of activity undertaken by the fishing vessel. In figure 2, described the following production activities conducted in the fishing vessel in the form of a flowchart. Stages of fishing vessel activities include preparatory activities until the fishing boats returned to shore after fishing operations at sea.

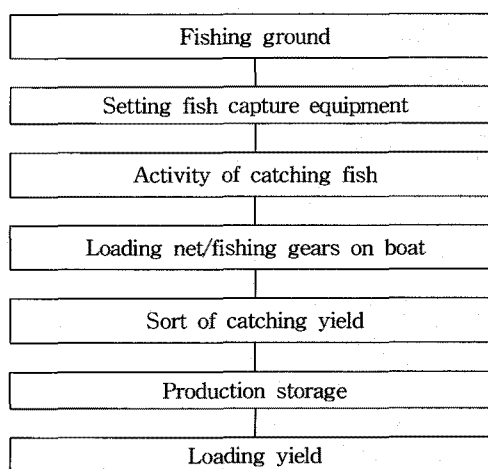


Fig. 2. Production activities of fishing vessels.

Apart from the work area and activities in the sea fishing accidents can also occur due to the influence of bad weather. It was explained that most of Aceh's fishermen did not know and understand about the safety system on the sea, so

that safety is something that can be ignored, however this can not be allowed to continue which will result in increased employment accidents at sea. Various factors that caused the fishermen throw over safety of fishing vessels in the sea as follows:

- 1) The low education level of fishermen on fishing standard.
- 2) The lack of information they receive about the importance of safety at sea.
- 3) More believe in persistence and stability of intentions in carrying out fishing activities in the sea.
- 4) The absence of specialized equipment for the safety of the fishing crew armada in water of Aceh.
- 5) Less government asserted in implementing safety systems on fishing boats in Aceh.
- 6) Limited capital to complete the safety equipment and safety standards associated with this activity, or it can be said there is no capital at all.
- 7) There are no suitable shipyard industry standards and is still relying on the traditional system in the fish vessel building.

In general, fishing vessels in Aceh is built based on knowledge derived shipyards were hereditary and is still traditional. As a result of non increasing of shipbuilding technology in Aceh is a major cause in the construction of the vessel has not implemented a system in accordance with safety standards. In this case, it will be described characteristic shape and construction as well as system on fishing boats in Aceh who do not give priority to safety, is as follows:

- 1) Body ship construction and top building
- 2) Machine system
- 3) Electrical system
- 4) Disposal system ballast water
- 5) Engine system help
- 6) Etc

For more details in terms of condition and characteristics of Aceh towards the application of fishing vessel safety system that can be customized with some rules through government policy in reducing the accident rate in the sea. In Table 6 below will show the temporary assessment of identification found on fishing boats in Aceh.

Table 6. The cause of fishing vessel casualties/accidents

Activity Hazard types	Facts	Probabilities
Safety system settings	Fishermen do not understand the rules of safety	Technical and non technical
Stability condition	Placement of fuel tanks and fresh water is not suitable, and the laying of the catch irregular	Risky the sinking ship, due to the ship unstable
Personal protection equipment	Not using standard equipment	Harm our health
The structure of the workplace	Inadequate, because it was too noisy with the sound and the main engine auxiliary machine can interfere	Stress and can disrupt health
Loading work	No warning	Overload and sink
Treatment	Un-maximum	Jammed and disrupted equipment
Management actions	There is no management in conducting fishing activities	Many parties will feel harmed
Electronic system for navigation help	There already on board, but an understanding of the operation of the device is still very low	Often the case wrong direction and not catch up
Radio communications system	Good applied, but not yet effective in conveying information	It can be informed where the fleet Captain and his crews to other parties
Circulation area - Hazardous Areas	None	Difficult to do in case of accident evacuation
Navigation conditions	Traditional and under standard	Fishing vessel maneuvers is not good
Weather & Climate conditions	Less concern for weather information from local government	The ship sank and drifted
Control panel	Still not obey the rules of electricity	Sparkling from an electric current that can cause fire
Technical measures	Excessive loading, failure of pumping, no design	High risk of occurrence sinking ship
Cooling system	Inadequate	High-temperature engine room and fire-prone
Main drive system	System damage, mechanical failure	Can not operate
Engine systems help	Not standard and often damaged	Inhibit catching process
Workplace lighting	Using standard non-marine	Ineffectively
Flammable gas tank	Flammable	Fires

※ Sources : The fleet casualties in fishing activity in Aceh, Indonesian Business(2005)

2.4 Aceh government policy on fishing vessel safety system

To be able to run a marine safety system that is consistent and acceptable by all parties involved in sea activities, require the active role of government in tackling and enforce the rules that have been stipulated in existing laws. The legal basis as the reference marine law enforcement is as follows:

- Law No.5 of 1993 about the ZEE/Zone Economic

Exclusive)

- Law No.21 of 1992 about shipping
- Law No.45 of 2009 about fisheries
- Government Regulation No.15 year 1994 concerning the management of natural resources in the Indonesian ZEE
- Government Regulation No.15 year 1990 concerning fishing effort. Jo.No.141 2000
- Government Regulation number 51 year 2002 about shipping
- Decree of the minister of maritime affairs and fisheries number 10 of 2002 on licensing of fisheries activities
- Regulation of the minister transportation No.KM 6/2005 on the measurement of ships
- Law No.14 year 1969 concerning occupational safety and health of workers
- Law number 1 year 1970 about work safety both on sea land and inland
- Law No.14 year 1969 concerning the terms and conditions of work safety

Due to culture and customs of the community in one place to another is not the same, therefore should be special rules issued by local governments in implementing safety on fishing boats in Aceh. The government of Aceh in this case is the department of marine and fishery Aceh is preparing qanun or fishery regulations that contain articles about safety in the sea for fishing boats/vessels in Aceh.

Local customary institutions Laot (Lembaga Adat Laot) has high roles in pushing the safety of fishermen at sea, for instance, the prohibition to sail on a Friday because that day is used for religious activities (Islam), together with families, repair ships and fishing gear, as well as the opportunity to give resources for growing fish.

To raise awareness about the importance of safety in the sea, the government of Aceh has been doing the procurement of navigational tools that support fishing activities. Nevertheless, due to the limited funds available caused of this activity has not been implemented uniformly to all fishing vessels in Aceh. The tools are given as:

- Life jacket
- GPS navigation equipment and fish finder
- VHF radio

In addition, local government will also make concrete steps

to improve safety systems in the sea. The measures that local government is about as follows:

- Provide basic training safety to fishermen
- Conducting certification master(handler) to ANKAPIN III
- Machinist ATKAPIN III³⁾ certification
- Developing a good communication system is directed from sea to land or vice versa
- Facilitating the fishermen go to sea with safety equipment
- The government of Aceh continue to encourage entrepreneurs to the shipyards that have standard production vessel
- The government encourages shipbuilding in Aceh, to use materials other than wood as raw material for hull construction and others
- Socialization form of alternative materials which are boats using glass fiber materials (FRP) to fishermen in Aceh
- The government of Aceh in this case the Marine and Fisheries Agency of Aceh to identify the risk that will be the cause of the accident and establish safety management systems in the sea, particularly on fishing vessel

3. Conclusion

An understanding of safety at sea by fishermen in Aceh does not meet safety standards. Therefore, there are needs to build the capacity of fishermen and necessary support facilities and infrastructure assistance to support the safety system in the sea. The marine and fisheries area of Aceh needs to:

- 1) Be propagated the navigational tools that support fishing activities;
- 2) Make concrete steps to improve safety systems in the sea;
- 3) Enforce the rules that have been stipulated in existing marine law; and
- 4) Identify the risk that will be the cause of the accident and establish safety management systems in the sea, particularly on fishing vessel.

In addition, further research on this topic is necessary for actual safety measures because we have some difficulties

ANKAPIN II/ATKAPIN III are the proper names of the regulations for sailors

gathering information on vessels' operations and safety consciousness of local seafarers. In the near future, therefore, we are planning to carry out supplementary programmes through joint research together with local specialists in Aceh, Indonesia.

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