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A Study on the Countermeasures for Securing Safety of Ship from Piracy Attacks

Seung-Dae Noh, Cheol-Seung Kim, † Sung-Hyeon Park*

* *Graduate school of Mokpo Maritime University, Mokpo 530-729, Korea*
**,† *Division of International Maritime Transportation Science, Mokpo Maritime University, Mokpo, 530-729, Korea*

Abstract : *This study is concerned with the applicable countermeasures for securing safety of ship from piracy attacks. For improvements and countermeasures, we analyzed the recent anti-piracy trends. In spite of international community's various activities for safety navigating, the number of piracy in Gulf of Aden and in the vicinity of Somali waters has been increasing dramatically in the last few years, so has the number of piracy on Korean vessels. In case of piracy attack which based on Somalia, it continues constantly and widely not only near shore, but coastal and oceanic waters. This study figures out the limitations of international community's efforts including military and legal improvements. There are no studies concerning the countermeasures of bridge protection by piracy. This study suggested the additional installation of outside door of bridge as well as the adjustment of piracy operation area(POA) of Korea navy.*

Key words : *Piracy, Countermeasures, Piracy Operation Area(POA), the High Risk Area, the Gulf of Aden*

1. Introduction

Over the last several years, the hijackings and taking hostages at sea have gradually increased. The pattern of a piracy has become supranational and non-military threat to international maritime society. Especially, the activities of pirates are happening to those vessels that pass through the Strait of Malacca, the Gulf of Aden, the Cape of Good Hope of South Africa, and the Gulf of Mozambique.

Moreover, the Strait of Malacca holds 40% of international trade and 80% of the crude oil import in Korea, and it is a very important route for maritime transportation.

While the piracy around the Strait of Malacca has been decreased substantially since 2004, the number of piracy around the Gulf of Aden (Somalia) has been increasing constantly.

Korea navy freed M/V Samho Jewelry from Somali pirates on January 21 by carrying out a commando operation "Dawn at the Gulf of Aden"

Countermeasures for piracy attack have been proposed by many researchers and institutions during several years. IMO recommends the enforcement of Best Management Practices (BMP)4 for anti-piracy. BMP is inducing shipping companies to take various measures.

Strong military action and the expansion of naval force are useful way, but these are not best solution from the cost side (Noh, 2010).

The Maritime Safety Committee(MSC) approved interim recommendations for flag states regarding the use of privately contracted armed security personnel(PCASP) on board ships in the high risk area.

Boarding a PCASP is also a good idea to secure the safety of ship which navigates the outside of escorted area by combined navy forces. However, ship companies have been under economic strains (Kim, 2009).

Choi, S.Y et. al.(2005) suggested the international cooperation framework and improvement of criminal law, obtaining the marine insurance for contingency.

Kim(2009) also emphasized the self-defence of each ship and multinational training exercise because all of korean vessel is difficult to be protected by navy force in broad Somali waters.

Lee(2011) proposed the establishment of special piracy tribunal, improvement of domestic law, authorized jurisdiction to captain of 'Chung-hae', and dispatched marine police to Korea navy. Realistically, militarization is difficult to be reflected in merchant ship (Kim, 2009).

It is generally agreed that self-defence is most important in the ship such as interior access lock, blockade of stairs, and installation of fire hose and etc.

It is important to protect bridge from pirates. However, little is known about the importance of bridge entrance in previous many studies. Right after boarding, pirates try to

* nj2110@hanmail.net 061)231-2324
** cskimu@mmu.ac.kr 061)240-7127
† Corresponding author, shpark@mmu.ac.kr 061)240-7127

occupy bridge first. Present bridge windows and doors are easily destroyed by pirates' weapons.

Installation of bulletproof door and window of bridge was considered as a concrete alternative in this study. It is necessary to amend SOLAS regulation for securing bridge with bulletproof door and windows. Besides, this study suggested the new adjustment of piracy operation area(POA), which navy force was extending according to piracy activity.

2. Analysis and characteristics of recent piracy

2.1 Recent status of piracy and its causes

Fig.1 shows all the piracy and armed robbery incidents reported by the IMB piracy reporting center during 2011. Pirate activities are concentrated near the Gulf of Aden, the Indian Ocean, and the Strait of Malacca.

Fig. 1 IMB Piracy & Armed Robbery Map 2011

As shown in Table 1, the number of incidents in Somalia has been dramatically increased from 19 cases in 2008, to 80 cases in 2009, to 139 cases in 2010, and 160 cases in 2011(ICC-IMB, 2011). While the piracy around the Gulf of Aden has been decreased substantially since 2009, the number of piracy around Somalia has been increased.

With naval forces concentrated in this area, Somali piracy was forced to move to the Arabian Sea. However, there remains a serious threat from piracy in the Gulf of Aden (Witherby Seamanship, 2010).

The main causes of African piracy are poor political, social, economical conditions, and absence of national defense in coastal states. Geographically, Somalia coastline is the longest coastline(3000km), and it has no strong winds. The Gulf of Aden, which is located in the northeast of Somalia, is connected with Red sea and Suez canal. Many merchant vessels pass through those areas.

Table 1 Locations of ACTUAL and ATTEMPTED attacks (2007-2011)

Locations		2007	2008	2009	2010	2011
SE ASIA		70	54	46	70	80
FAR EAST		10	11	23	44	23
INDIAN OCEAN-EAST		30	23	30	28	16
SOUTH AMERICA		21	14	37	40	25
AFRICA	other	76	78	69	67	96
	Gulf of Aden	13	92	117	53	37
	Somalia	31	19	80	139	160
other		12	2	8	4	2
Total at year end		263	293	410	445	439

2.2 Trends of Somali pirate attacks in 2011

Piracy in Somalia is changing into the business industry organized by mother ship, which is equipped with heavy weapons, state-of-the-art communication, and several high-speed boats. It is also expanding as far as the Indian ocean, Red sea, and East Somalia (Choi, 2011).

The IMB PRC has recorded 439 incidents of piracy and armed robbery in 2011. Somali pirates account for almost half of the 2011 attacks (Fig. 3).

While the overall number of Somali incidents has increased from 219 in 2010 to 237 in 2011, the number of successful hijackings has decreased from 49 in 2010 to 28 vessels in 2011. In 2011, Somali pirate attacks were predominantly concentrated within the cross roads of the Arabian Sea and the Gulf of Aden, and the role of the navies is critical to the anti-piracy efforts in this area. Vessels attacked included general cargo ship, bulk carrier, all types of tankers, Ro-Ro, container ship, fishing vessels, sailing yachts, and tugboats (refer to Fig.2). The number of attacks has increased, but successful hijackings have reduced due to the actions of the naval forces and preventive measures of merchant vessel.

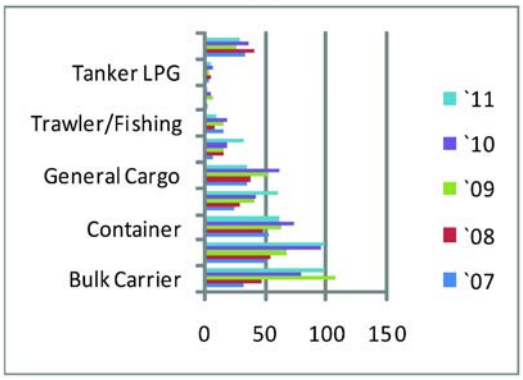

Fig. 2 Types of vessels attacked(2007-2011)

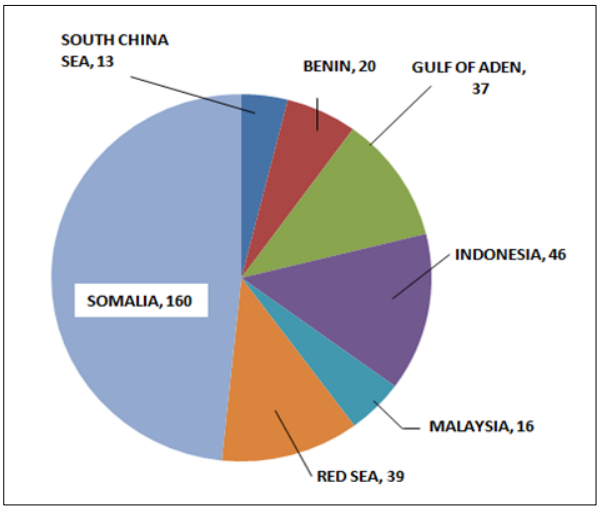

Fig. 3 The seven locations recorded 75% attacks from a total of 439 reported attacks in 2011

3. Limitations of recent anti-piracy and improvements

Despite of the effort of international society, there are still several limitations.

3.1 A vast area of jurisdictions

The broad expansion of activity region is one of the most advantageous conditions of pirates. As shown in Fig.4, piracy appears even the 1,500 miles off shore in case of the Gulf of Aden and Somalia. Because of vast area, navy force is difficult to involve practically in piracy attack. Patrolling of P-3C planes or unmanned aerial vehicle(UAV) is effective solutions, but it is a burden in cost side.

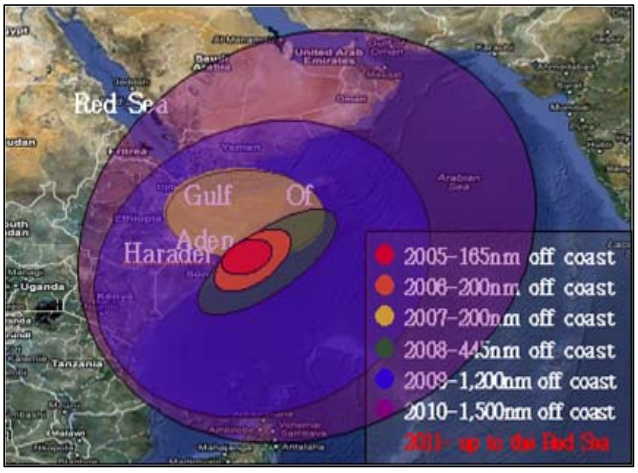

Fig. 4 The geographical expansion of piracy (2005~2011)

3.2 Tactical competition due to profit and restriction

Considering the vast area and importance of anti-piracy, it is necessary to increase navy force. However, there are various risks which may decrease sharply the effect of military operation. First of all, we can easily predict the formation of military force. Power of the involved nations cannot expand indefinitely. Each naval force has their own set of objectives and rules. These forces can sometimes cause problems of regaining the principle of peace in international waters and preventing pirate activities. For these reasons, tension and pressure have inevitable limitations in the long term.

3.3 Absence of long-term solution

International Maritime Bureau(IMB) evaluates actions of international community, and the result of evaluation is effective in stopping piracy on main sea routes. However, the number of pirate activities is on the rise. It means military operations cannot keep up with the number of piracy incidents. Therefore, more fundamental and multilateral measures are needed like attacking pirate headquarters in coastal states or helping coastal states to gain political and economical stability, but it also shows limitation because of conflict among nations.

4. Securing safety of ship

4.1 Analysis of military cooperation and operation

The most efficient way to prevent the piracy is navigating with the escort of navy force. However, because of operational limitations, it is difficult to be escorted for all vessels navigating the Gulf of Aden and the Indian oceans.

In the past, coastal states near Malacca strait worked together and made agreements like 'ReCAAP' and 'Eye of the Sky' which resulted in drastic drop in number of piracy in Southeast Asia. Successful cases like 'ReCAAP' and 'Eye of the Sky' are needed to apply in Somali anti-piracy operations.

As shown in Table 2, in order to combat against increasing piracy in the Gulf of Aden and Somalia, navy vessels and aircraft are dispatched by USA, Japan, EU, NATO. Korea also has dispatched 'Chung-Hae' navy units to the Gulf of Aden since 2008 for securing safety of ship.

A total of 20 nations and 30 naval vessels have been joined anti-piracy operation (National Defense University, 2011). However, those are not enough to secure safety of

all the civilian vessels that pass through the Gulf of Aden and the Indian Oceans.

As shown in Fig. 5, activities by the Combined Task Force(CTF) 151, operating in the Gulf of Aden, Somalia and Arabian Sea in order to combat piracy, under the command of Turkish between 1 September and 1 December 2010.

Table 2 Navy forces operating in Somali waters

Sort		no. of ships	nations	o-day
ships	CTF-151	3-5	15 (USA, BR, KOR etc)	2009.1
	CTF-465	6-12 (Atlanta)	13 (EU members)	2008.12
	CTF-508	4-5 (Operation Ocean Field)	11 (NATO members)	2009.3
	single operation	20	KOR, USA, JPN, RUS, CHN, IND, THAI, MYS, IDN	
total		40	—	
Maritime patrol air crafts		20 units	USA, SPAIN, GERMAN, JAPAN, SINGAPORE, PORTUGAL, LUXEMBURG	

Fig. 5 The area of combined task force

One of useful suggestion is to extend opportunity in escort operation of navy forces. Other effective solution is to divide the vast surveillance area like Fig. 6 (Chung-Hae, 2012).

As shown in Fig. 6, POA(Piracy Operation Area) is extending according to the expansion of piracy. It may be good idea to dispatch P-3C patrol planes and unmanned aerial vehicle(UAV) rather than navy vessels in respect of high mobility.

In this study additionally suggested new POA based on the recent piracy status, direction and destination of vessel (refer to Fig. 7). Navy force needs to recognize that many merchant vessels use general steady courses having own destinations. Periodical patrol along the main course will be more useful suggestion rather than own military policy. Lynx and warship can be used in different situation.

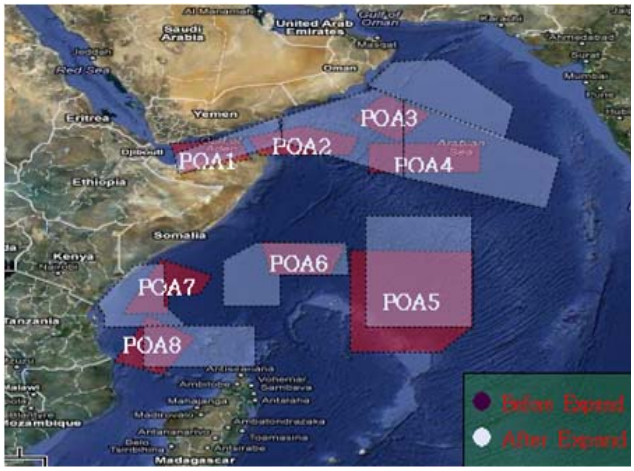

Fig. 6 Piracy Operation Area(POA) in the Gulf of Aden

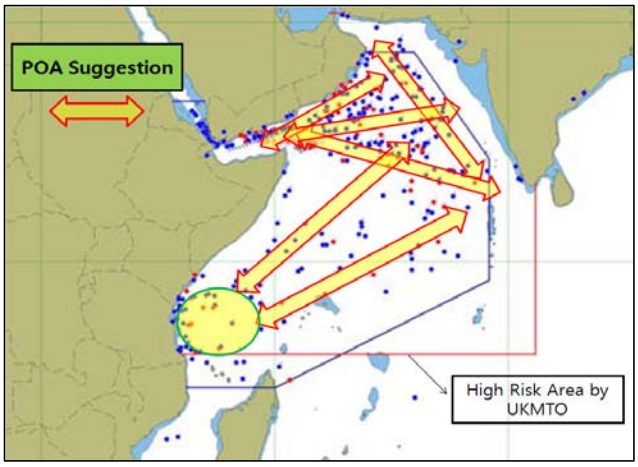

Fig. 7 Status of recent piracy and suggestion of POA

4.2 Improvements in legal response and construction of counter-piracy system in merchant shipping

As mentioned previously in Introduction, many researchers and institutions have proposed the legal improvements concerning piracy such as establishment of pirate tribunal, agreement among relevant countries, authorized jurisdiction to captain, dispatch of marine police to Korea navy, making a handbook of related international laws, education of dispatched naval officer and

acknowledgment of universal jurisdiction in the international waters.

Fig. 8 Installation case of anti-piracy equipment

Besides, the master should ensure that BMP measures are in place prior to entry into the high risk area (an area bounded by Suez and the Strait of Hormuz to the North, 10°S and 78°E) (Witherby Publishing, 2011). Above all, the ship protection measures described in BMP are the most basic and likely to be effective.

- Watch-keeping and Enhanced Vigilance
- Closed Circuit Television (CCTV)
- Maneuvering Practice - Zigzag Maneuvering
- Alarms
- Upper Deck Lighting
- Deny Use of Ship's Tools and Equipment
- Protection of Equipment Stored on the Upper Deck
- Control of Access to Bridge, Accommodation
- Enhanced Bridge Protection
- Physical Barriers
- Water Spray and Foam Monitors
- Safe Muster Points/Citadels
- Unarmed Private Maritime Security Contractors
- Armed Private Maritime Security Contractors

Fig. 8 shows available installation cases of anti-piracy equipment in merchant vessel. In addition to this, safety zone(citadel), surveillance systems, recommended use of AIS, fixed unmanned fire-fighting equipment, General Information Center on Maritime Safety & Security(GICOMS), and Vessel Monitering System(VMS) are presented.

Electrified barriers, razor wire and protective wire mesh of bride are good ideas, but these are quite cumbersome to install and disassemble. Moreover, one fire hose or one water cannon system cannot be satisfied because pirates momentarily approach merchant ship with several high-speed boats. Additionally, water cannon system should complement the covering for securing detailed system.

In this paper, we suggest the introduction of regulation concerning the outside of bridge, especially the area of windows and doors. Many researchers and shipbuilding company did not recognize the importance of outdoor and windows. Fig. 9 shows the windows are easily destroyed by military weapons. At the very least, outside door and windows of bridge should be reinforced with bulletproof material.

Fig. 9 Weak point of bridge (M/V Samho Jewelry)

Other container ship also show its weak point (see Fig. 10). We need to know pirates try to occupy bridge in

advance for hijacking. Duty officer should try to gain time, but existing countermeasures overlook this problem, and there is no protective system around bridge. Like the cases of double bottoms, which are significantly safer than single bottoms, it is necessary to make bulletproof windows or protective entrance door by SOLAS convention.

Fig. 10 Outside of container ship (M/S Lexa Maersk)

5. Conclusion

In recent years, there has been increased interest in countermeasures for piracy. Various existing countermeasures are presented, and some new ideas are highlighted. The action of international society is dispatched by navy vessels and aircrafts to deter this piracy, but it made piracy area going out to sea and doing piracy actively.

For safe navigation in the high risk area, this study suggested available countermeasures such as installation of bulletproof bridge windows, and adjustment of pirate operation area based on the main course of merchant ship.

There are many countermeasures for securing safety of merchant vessels, but it is not useful in reality. Some measures impose considerable financial burdens.

As pirates try to occupy bridge for hijacking, duty officer has to keep bridge with mentioned countermeasures such as bulletproof windows and doors. Present system is very weak by weapons, especially windows and entrance doors of bridge. In the long view, adjusting a pirate operation area (POA) of Korea navy is also effective measure in securing safety of merchant vessels.

Future research on countermeasures of piracy will include the assessment of bulletproof windows, protective entrance door.

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