

# The Economic Impact of Maritime Piracy in the Gulf of Aden: challenges and implications

Enrico D'agostini\* · Dong-Keun Ryou\*\* · † So-Hyun Jo

\*Graduate school of Korea Maritime and Ocean University, Busan 606-791, Korea

\*\*Division of Shipping Management, Korea Maritime and Ocean University, Busan 606-791, Korea

† Korea Institute of Maritime and Fisheries Technology, Busan 602-806, Korea

**Abstract** : The purpose of this paper is to analyze maritime piracy and its economic implications with particular attention to attacks registered in the Gulf of Aden. The paper also aims to investigate how the International community, along with Sovereign States, should allocate resources in order to make the seas a safer place and describe how closely inter-related maritime piracy, preventive and punitive measures put in place by Governments are. Elements of economics and ergonomics are taken into account in order to properly investigate the major legal issues relating to maritime security. The paper proposes a cost-benefit analysis in order to investigate in theory what is the rationale behind engaging in criminal behavior and recommend some solutions to the issue to be undertaken by the International community. It is concluded that in order to cost effectively fight piracy, a mix of more coordinated National and International laws, standardized and increased punishment levels among jurisdictions and extended patrol controls are needed.

**Key words** : Maritime piracy, Criminal behavior, Economic Impact, cost-benefit analysis, preventive and punitive measures

## 1. Introduction

Despite piracy is an old phenomenon, well known even since the times of ancient Romans, in the modern era it is all but disappeared. It is increasingly a very serious threat to the shipping industry as it is affects directly and indirectly seaborne trade in many regions of the World, causing severe economic implications to a big number of stakeholders (Mbekeani & Ncube, 2011).

Although according to International Maritime Bureau (IMB) 2014 report piracy seems to be a decreasing phenomenon in terms of total recorded attacks in the area of the Gulf of Aden, in other regions of the world like Indonesia and Malaysia the number of actual and attempted attacks have increased exponentially. In Indonesia, in 2010, 40 pirates' attacks were reported in the Region whilst on 2014 the number was up to 100; in Malaysia, in 2010, there had been 18 attacks and in 2014 attacks rose to 24 (IMB Report, 2014).

Piracy is responsible for creating fear and economic losses among the maritime community. As stated by Noble, "maritime piracy is really nothing more than

transnational organized crime operating on the high seas and benefitting from their profits on land" (Noble, 2010).

International Organizations such as the International Maritime Organization (IMO) and the IMB are proactively trying to find pragmatic solutions to come up with, but piracy is a very complex issue; due to the existing problems with legal definitions and lack of coherence in domestic laws, it is difficult to draw a bond between piracy, armed robbery and terrorism (Noh, S.D. et. al., 2012). The multi-facet implications that a maritime security incident can cause are several and include repercussions in legal, economical social and political areas (Anele, 2015; Jeong, 2012 ). For this reasons, the paper aims at investigating these implications through a cost-benefit analysis and proposing some more cost effective solutions to be considered by the International community to address properly the issue of piracy.

## 2. Piracy

Despite the awful acts committed by pirates and terrorists, these individuals can, at all effects, be

† Corresponding author : calmseas0905@hotmail.com 051)620-5806

\* enrico@kmou.ac.kr 051)410-4381

\*\* dkryoo@kmou.ac.kr 051)410-4381

Note) This paper was presented on the subject of "A Study on Maritime Piracy : Criminal behavior and its economic implications" in 2015 Joint Conference KINPR proceedings(Korea Maritime and Ocean University, 9th July, 2015, pp. 205-207).

considered rational actors. This implies that they exactly and rationally know what the benefits, the costs and the risks involved in a certain criminal action are. (Fiorentini & Peltzman, 1995). In economic terms, it means that an individual or a criminal group attempt to get the maximum benefits out of their scarce resources balancing, for example, the benefits of a ransom against the possible threat of persecution, incarceration, injury or death. (Kaprove, 2013).

On the other side, Governments are responsible for drafting countries' legislations and need to adopt a certain level of protective measures for the citizens, with the primary objective to keep them as much cost effective as possible (Lee, 2005). The most important factor to be taken into account for policy makers, is to find a proper balance between resources allocated and deterrent for the criminals, with the objective of reducing the total social cost caused by criminal acts (Xu, 2010).

Measures adopted can be different, according to the behavioral type of criminals involved. In the maritime security field, for instance, a severity of punishment is found to be an effective deterrent against piracy, whilst with terrorists it has proven to be ineffective. There is rather the need to adopt preventive measures because the attitude terrorists have towards life or death is very different from the one pirates have (Mukharjee *et al*, 2009).

Maritime piracy and terrorism may appear to have similar features but they are fundamentally different concepts, each of whom with unique characteristics (Choi, S.Y. *et al*, 2005). In order to fully appreciate these ideas, it is important to briefly introduce the concepts of territorial water, contiguous zone, continental shelf and exclusive economic zone defined by United Nations Convention on the Law of the Sea (UNCLOS) as follow:

- 1) **Territorial Zone:** *It is a zone that extends 12 Nautical Miles from the Coast and over which the State is free to set laws, regulate and use any resources. Vessels from other countries are given the right of "innocent passage", i.e. "passing through waters in an expeditious and continuous manner not prejudicial to peace, good order or security of the Coastal State".*
- 2) **Contiguous Zone:** *It is a zone that extends a further 12 nautical Miles beyond the territorial waters, or 24 nautical Miles from the Coast.*

*Within the contiguous zone, a State can continue to enforce laws with respect to pollution, taxation, customs and immigration.*

- 3) **Continental Shelf:** *It is the natural prolongation of the land territory up to 350 Nautical Miles from the coastline baseline over which States also have the exclusive right to harvest minerals and nonliving material in the subsoil.*
- 4) **Exclusive Economic Zone (EEZ):** *It is a sea zone over which a State has special and sole exploitation rights over all marine resources. EEZ extends 200 Nautical Miles from its coast and it includes territorial water, contiguous zone, and Continental Shelf*

In order to further clarify the definitions, according to UNCLOS (ART. 101) piracy is considered:

*" (a) Any illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed:*

*(i) On the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft;*

*(ii) Against a ship, aircraft, persons or property in a place outside the jurisdiction of any State;*

*(b) Any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft;*

*(c) Any act of inciting or of intentionally facilitating an act described in subparagraph (a) or (b)" (UNCLOS, 1982).*

Notwithstanding UNCLOS definition, the IMB defines **piracy** as:

*"An act of boarding (or attempted boarding) with the intent to commit theft or any other crime and with the intent or capability to use force in furtherance of that act."*

### 3. Piracy: a huge economic impact

When a piracy attack takes place, several direct and indirect costs arise among very different stakeholders. In fact, individuals alike organizations can be financially affected when a merchant ship is hijacked. Officials, pirates, maritime insurers, security companies, navy, merchant marines and financiers all play a key role in the maritime security arena.

Although to some scholars the problem of piracy remain small (Leeson, 2009) with “less than one third of 1% of total ships attacked every year by pirates (Wallis, 2010), the economic impact is huge and there are many “hidden costs” (Kaprove, 2013)

The cost of maritime piracy unfold on two different levels which are the cost to the International community and the cost of running piracy operations both at sea and on land. Table 1 shows the total cost of Somali-based piracy in 2013 listing each individual cost and its associated low and high estimates. The highest cost is associated with the cost of security equipment and guards, followed by the cost of military operations, the cost of labor, the cost of increased speed, the cost of insurance, the cost of counter-piracy organizations and lastly, the cost of prosecutions and imprisonment.

Table 1 Total cost of Somalia-based piracy 2013

	LOW	HIGH
Cost of military operations	\$998,586,838	\$998,586,838
Cost of security equipment and guards	\$1,015,752,137	\$1,177,302,507
Cost of increased speed	\$276,154,781	\$276,154,781
Cost of labor	\$462,134,710	\$462,134,710
Cost of prosecutions and imprisonment	\$12,187,694	\$12,187,694
Cost of insurance	\$185,703,266	\$185,703,266
Cost of counter-piracy organizations	\$44,708,922	\$44,708,922
TOTAL	\$2,995,228,348	\$3,156,778,718

Source : The State of maritime piracy 2013

Probably the most important direct cost is the cost of paying a ransom, which has exponentially increased in the last years especially in the Gulf of Aden area (Madsen *et al.*, 2013). In other areas of the world, for example in the

South-East Asia region, pirates have rather preferred to steal the ship's cargo and not ask a ransom; in fact these type of attacks tend not to be considered as “piracy” in International law but rather as “armed robbery against ships” (Beckman, 2012).

Table 2 Ransom payments and hostage situation duration

	2012	2013
Number of vessels released after ransom payment	8	3
Average number of days that released hostages were held captive	316 day	567 day
Average ransom payment	\$3.97M	\$7.20M
Total Ransoms Paid	\$31.75M	\$21.60M

Source : The State of maritime piracy 2013

In 2005, ransoms paid amounted at about \$ 150,000 whilst in 2009 averaged at \$ 3.4 Million. (Bowden, 2010). In 2012 and 2013, as shown in table 2, the trend continued steady although in 2013, the number of vessels released after ransom payment decreased, the average ransom payment almost doubled but the total ransoms paid decreased due to the lower number of attacks. (Madsen *et al.*, 2013)

The growing threat of piracy posed to the maritime industry has seen a firm response from insuring companies, which have substantially increased premiums in high-risk areas such as the Gulf of Aden and the Malacca strait. War risk insurance premiums have, for example, increased 300 fold<sup>2)</sup> since 2008, but in 2013 war risk insurance and marine Kidnap for Ransom and Hijack Insurance (K&R) premiums have started dropping compared to 2012 levels, totaling around \$ 185 Million (Helmick, 2015).

Similarly, cargo insurance premiums have also rose dramatically and Maersk Line has been charging “war risk” for containers passing through the Gulf of Aden at \$ 25 for 20 foot and \$ 50 for 40 foot containers<sup>3)</sup>.

A cost which shipping companies should take into account in order to protect their ship and the cargo is the deterrent cost, represented by the purchase of security equipment and specialized armed personnel on board. Table 3 illustrate the types of equipment most commonly used and for each of them the estimated low and high cost.

2) [http://www.maritimelondon.com/london\\_matters29june09.htm#1](http://www.maritimelondon.com/london_matters29june09.htm#1)

3) <http://ipezone.blogspot.kr/2010/09/its-time-to-join-fight-against-maritime.html>

Table 3 Cost of security equipment

Type of equipment	Unit cost per ship	Unit per year	Rate of use (low)	Rate of use (High)	Total cost(low)	Total cost (High)
Razor wire	\$1,400,000	2	80%	80%	\$147,665,280	\$147,665,280
Water cannons	\$118,755	0.2	0.25%	0.83%	\$3,914,283	\$12,965,421
Electrified barriers	\$39,585	0.33	0.75%	2.50%	\$6,458,567	\$21,528,559
Warning signs	\$45	3	80%	80%	\$711,957	\$711,957
Acoustic devices	\$21,000	0.2	5%	15%	\$13,843,620	\$41,530,860
Sandbags	\$1,424	1	80%	80%	\$75,106,780	\$75,106,780
Total					\$247,700,487	\$299,538,857

Source : The State of maritime piracy 2013

Avoiding a war zone at sea, may be seen by some owners and operators as a safer or cheaper option. Avoiding to pass through the Gulf of Aden means re-routing and passing through the Cape of Good Hope adding days and fuel costs to the total trip. According to an estimate done by One Earth Future, the shipping industry may pay around \$ 2,5 to \$ 3 Million per year as a consequence of re-routing ships and avoid piracy areas. (Bowden, 2010).

Another cost is represented by the naval presence in some piracy areas and particularly in the Gulf of Aden, at high risk due to Somali piracy. Currently, more than 27 countries are contributing to International missions with their National naval forces. Table 4 indicates the vessel distribution (deployment of surface vessels, patrol aircrafts and helicopters) in the area of the Gulf of Aden whilst Table 5 shows the grand total operating costs of surface vessels and aircrafts.

Table 4 Vessel distribution

	EU NAVFOR Operation Atalanta	NATO Operation Ocean Shield	CMF CTF 151	Independent Deployers
Surface Vessels	5.5	2	1.75	9.5
Patrol aircrafts	3	0	1	2
Helicopters	5			

Source : The State of maritime piracy 2013

Table 5 Grand total operating cost

	Operating cost		Fuel cost	Total
	Independent operators	Coalition operations		
Surface Vessels	\$58,820,000	\$168,728,400	\$684,901,155	\$912,449,555
Aircrafts	\$4,732,800		\$34,845,339	\$39,578,139
Total	\$232,281,200		\$719,746,494	\$952,027,694

Source : The State of maritime piracy 2013

Additional costs which should not be underestimated, are those arising from pirates' prosecutions and the International community has agreed to financially support

and encourage Somalia neighboring countries to conduct trials and imprisonments. Table 6 provides a picture of the costs related to prosecutions and imprisonment in different world's Regions.

Table 6 Cost of security equipment

\* less UNDOC funded countries

Region	**	Average Cost per Trial	Total Trial Cost	Pirates Imprisoned	Average per Year of Imprisonment	Total Imprisonment Cost	Total Regional Cost in 2013
Africa*	8	\$228	\$1,824	659	\$730	\$481,070	\$4,828,934
Asia	2	\$7,314	\$14,628	134	\$376	\$50,318	\$64,946
Europe & Japan	8	\$638,800	\$5,070,400	101	\$47,794	\$4,827,154	\$9,897,554
N. America	3	\$307,355	\$922,065	29	\$28,284	\$820,236	\$1,742,301
TOTAL			\$6,008,917	923	N/A	\$6,178,778	\$16,533,735

\*\* Numer of Pirate trials

Source : The State of maritime piracy 2013

Moreover, there are indirect costs related to the growth performance of regional littoral economies. Macroeconomics costs are represented by increased costs in regional trade, cost to food price inflation, and cost of reduced foreign revenue. In 2010 the direct costs of piracy ranged from \$ 3.7 to \$ 6.6 Billion with indirect costs ranging from \$ 1.2 to \$ 1.8 Billion and an estimated total cost ranging from \$ 4.9 to 8.3 Billion (Bowden, 2011).

#### 4. Benefits for the pirates

A rational criminal would not commit a crime if he expects the sanctions to be greater than the expected benefits. The reason behind why an individual decides engaging in criminal behavior is explained by Becker. A rational individual decides to become a criminal because the costs and benefits towards that crime differ from the cost and benefits to commit the same crime for another individual (Becker, 1968).

Among the costs, the sanction is calculated according to the likelihood of the offender being detained, the likelihood of him being tried, the sentence he might be given and the nature and quantum of the punishment received.

Therefore, from an economic point of view, when the possibility of ensuring to justice a criminal is low, the penalty for committing that crime should be greater than the benefits the criminal expect to get if not caught (Mukharjee *et al.*, 2009).

Psychological aspects play also a role in the criminal behavior of individuals. Gerts and Gould found that there is a direct link between the fear of punishment and the personal level of criminal's inhibition. Therefore if a rational criminal knows that the punishment for an action is high and the expected benefits are low, that individual would search for an alternative with higher benefits (Gerts & Gould, 1995).

Besides the benefits' analysis, there is the rational profit maximization theory described in neo-classical economics. Opportunity cost is defined in economics as *"the amount lost by not using the resource (labour or capital) in its best alternative use"* (Begg *et al.*, 1984). Therefore, the forgone opportunity to do something else is to be considered a cost for the criminals. Taking into consideration that a Somali man might earn around \$ 14,500 over an average working life-time assumed to be of 29 years. It is also assumed that this is the best next alternative to engaging in piracy (Bowden, 2011). On the other hand, it has been estimated that an average pirate could earn between \$ 33,726 and \$ 78,840 a year, depending on the ransom paid. It is logical to presume that the benefit in pure monetary terms of engaging in piracy compared to the next best alternative is overwhelming. In addition, piracy engagement is assumed to be around 3-5 years whilst the average working life time of a normal individual would be of 29 years (Bowden, 2011).

Assuming an engagement of 5 years, a pirate's earnings could be estimated to be between \$ 168,630 and \$ 394,000. As GDP/Capita in Somalia is around \$ 500 per year, a pirate remuneration would be between 67 and 15t times the current annual pro capita GDP (Bowden, 2011).

Table 7 Low-high case annual/lifetime Somali pirate revenues in US\$ based on 1,500 Pirates

		Lower Case	Middle Case	High Case
A	N. of pirates	1500	1500	1500
B	Ransoms	\$3,500,000	\$4,000,000	\$4,500,000
C	Success rate	22%	30%	40%
D	2010 Incidents	219	219	219
E	GDP/Per capita	500	500	500
F	Average/income/pirate/year	\$33,726	\$52,560	\$78,840
G	F/E average of times income	67	105	157
H	Average pirate lifetime earnings	\$168,630	\$262,800	\$394,200

Source : The economics of piracy: pirate ransom and livelihoods of the coast of Somalia

Table 8 Low-high case annual/lifetime Somali pirate revenues in US\$ based on 3,000 Pirates

		Lower Case	Middle Case	High Case
A	N. of pirates	3000	3000	3000
B	Ransoms	\$3,500,000	\$4,000,000	\$4,500,000
C	Success rate	22%	30%	40%
D	2010 Incidents	219	219	219
E	GDP/Per capita	500	500	500
F	Average/income/pirate/year	\$30,660	\$35,040	\$39,420
G	F/E average of times income	61	70	79
H	Average pirate lifetime earnings	\$153,300	\$175,200	\$197,100

Source : The economics of piracy: pirate ransom and livelihoods of the coast of Somalia

Table 7 and table 8 show low, medium and high case scenarios based on 1500 active pirates (table 7) and on 3000 active pirates (table 8) off the coast of Somalia, an assumed ransom range of \$ 3,5 Million, 4 Million and 4,5 Million, an assumed success rate of 22%, 30% and 40%, and the number of incidents which took place in 2010.

Table 7 indicates that an average pirate lifetime earnings (calculated on a 5 years period) in the 3 different hypothesis are \$ 168,300 in the lower case, \$ 175,200 in the middle case and \$ 394,200 in the high case. Similarly, table 8 shows that average earnings, based on 3000 pirates would be of \$ 153,300, \$ 175,200 and \$ 192,100 in the 3 different cases scenarios. In both tables, results suggest that even in the lower case, the earnings would be respectively 67 times (Table 7) and 61 times (Table 8) higher than National GDP.

## 5. The challenges of punitive measures against piracy

Pirates face the costs of death, injury or imprisonment. Based on the risk adjusted cost of death, injury or imprisonment, according to opportunity foregone, ranges from an estimated low of \$1.666 to an estimated high of \$ 3.333, which is significantly lower than the \$ 14.500 arising from the next best alternative of being a pirate. Until the risk adjusted cost of being a pirate is lower than the benefit of the next best alternative, piracy will not only continue existing, but will proliferate (Bowden, 2011).

Due to relative poverty of most Somali pirates, punishment such as fines or other economic sanctions are not useful against actors who are insolvents (Kaprove,

2013): imprisonment was defined by Becker as “the discounted sum of the earnings foregone and the value placed on the restrictions in consumption and freedom” (Becker, 1968) and the total cost of imprisonment is higher for those whose earnings are greater outside of prisons and whose freedom is very valuable. For Somali pirates, earnings outside of freedom are low and, compared to a normal individual, the value of freedom may be lower. Therefore, imprisonment, due to its high social costs and death penalty, due to its moral controversy, are deterrents which leave some open questions about their real effectiveness (Kaprove, 2013).

Although each Sovereign State has in principle jurisdiction to prosecute pirates, the conflicting definition of piracy in International law, and the predominance of attempted and actual attacks near Countries that lack resources to efficiently and properly prosecute pirates, makes it difficult in enforcing it within the International legal framework (Chang, 2010).

A further gap arises from the fact that there is no International standard for the punishment to be imposed on pirates and different sentences for similar cases create unfairness.

Table 9 Sentences by Region

	MIN. SENTENCE	MAX. SENTENCE	MEAN
GLOBAL	4.5	60	18,85
EUROPE	5	30	9.75
UNITED STATES	30	60	29
REGIONAL	4.5	60	23.88

Source : Kontorovich, 2012. The penalties for piracy

Table 10 Severity of crime

LEVEL OF VIOLENCE	MIN. SENTENCE	MAX. SENTENCE	MEAN
ATTEMPT	5	20	7.13
SHOTS FIRED	4.5	60	8.59
DETENTION	5.5	34	21.88
ASSULT/INJURY	5	24	29.5
DEATH	13	60	34.33

Source : Kontorovich, 2012. The penalties for piracy

Data in Table 9 and 10 covers 30 Somali piracy incidents which involved 209 individuals and 39 separate sentences were considered in the time period from 2006 to 2010.

Sentences seem to be affected by 2 different factors: the first one varies across countries, which have different legal frameworks and consequently different sentencing norms. As shown in table 9, sentences of pirates differs widely across different Regions. In particular, in Europe

the minimum sentence 5 years and the maximum is 30 years with a mean of 9.75 years; in the United States the minimum sentence is 30 years and the maximum sentence is 60 years with a mean of 29 years.

The second factor varies across pirates and their criminal behavior. Sentences may vary across different jurisdictions but also according to how violently pirates carry out an attack.

Table 10 illustrate the severity of crime according to the level of violence. The minimum and maximum sentences differs across National sentencing statues and policies. An attempt attack’s sentence range from a minimum of 5 years to a maximum of 20 years whilst in case of a violent attack resulting in the death of crew member, the sentence ranges from a minimum of 13 years to a maximum sentence of 60 years.

Therefore, across different jurisdictions exists a large variance in the sentences and this phenomenon tend to weaken the fear of punishment of pirates, hence the deterrent value is substantially reduced as the outcome of the punishment becomes more unpredictable (Kontorovich, 2012).

## 6. Conclusion

A rational criminal would not commit a crime if he expects the sanctions to be greater than the expected benefit of his act. Therefore the expected sanction should be planned in a way that just suffice to counterbalance the expected benefit obtainable by a criminal (Mukharjee *et al*, 2009).

According to Thomas Miceli, the use of criminal solicitation is a good strategy for law enforcement and an optimal use of solicitation, would balance the cost of extra war ships and the greater likelihood of punishment (Miceli, 2007). Under an economic prospective, according to the trade-off between certainty and severity of punishment, when the likelihood of punishment increases (adding for example more warships patrolling the area) the severity of punishment can proportionally decrease (Xu, 2010). In this regard, the International Community along with International Maritime Organization are indeed investing time, human and financial resources in order to reduce and prevent piracy attacks. Recently, the certainty of punishment in the Gulf of Aden has increased, due to the efforts in trial and prosecutions, although the gap in severity across jurisdictions must still be overcome. For

these reasons, in the last few years, from the point of view of a pirate the attractiveness and the benefit of a criminal act at sea have decreased.

Nevertheless, in case the resources are limited and preventive measures are too costly to be implemented, is preferable to adopt and emphasize more on punitive measures (Mukharjee *et al.*, 2009). As concluded by Kaprove, in order to minimize social losses, it is fundamental to identify the costs related to the punishment for piracy and the comparative earnings to be obtained from alternative activities. (Kaprove, 2013)

Severity of punishment can work as a deterrent for pirates but the differences in sentencing pirates across different jurisdictions poses a huge challenge to the issue. In the case of Somali pirates a combination of preventive measures and punitive measures have been used and have proven, in last few years, to work more efficiently than in the past.

Actual and attempted attacks in the Gulf of Aden have sharply decreased although the phenomenon has not yet been completely annihilated. In this paper, the case of Somali piracy was investigated due to the larger number of data availability but piracy in other areas of the globe is proliferating, particularly in South-East Asia (IMB Report, 2014) and the same principles of criminal behavior described in this article should be applied.

Machin and Meghir proved that factors like economic development, political stability, and educational programs schemes do help in reducing crime and should therefore be considered as powerful tools to be adopted by the international community to help reducing the crimes at sea (Machin & Meghir, 2000).

Some scholars have suggested that the best way to address the problem of piracy is to focus on its direct causes like new National and regional investments would make more attractive a job on land, increasing the opportunity cost for those deciding to be a pirate and therefore reducing the attractiveness of engaging in piracy (Kaplan, 2009). Furthermore, reducing the expected benefits would reduce the crime (like black market controls, enforcement of laws at a regional level).

However, as pirates attacks' trend is moving to the South-East Asia Region, new tools and policies will be needed both to the International Community and the Regional States. In order to effectively reduce the danger of piracy in the area, a Regional response will be needed, but at present a cooperation agreement is far from being

reached. As around one-third of the world's ships move through waters in the South-East Asia (Brandon 2000), the importance of keeping safe the area are obvious and the economic implications of a potential increase in pirates' attacks may have a huge impact.

In order not to lose precious time, despite the recent increased interest from ASEAN (Association of Southeast Nations) and ARF (ASEAN Regional Forum), countries in the Region will have to make a step forward addressing the issue and concentrating the available financial resources both on preventive and punitive measures. (Bulkeley, 2003)

Should regional states fail, in the short term, to coordinate national laws and regional procedures governing the capture and punishment of pirates, standardize the punishment levels in different jurisdictions and invest in patrols, maritime security in the area will continue to be a threat to economic, social and environmental stability of the Region. The paper intended investigating the economic impact of maritime piracy in the Gulf of Aden, through a cost-benefit analysis and it proposed a different approach from the previous studies including both elements of economics, ergonomics and the challenges that sovereign states and the International Community should undertake. However, the study has some limitations that should be further investigated. For example, it would be interesting to analyze the economic impact of maritime piracy in other areas of the world and investigate more deeply how punitive measure put in places by sovereign states influence the criminal behaviour of pirates.

## References

- [1] Anele, K. K.(2015), "Taming the Tide of Maritime Piracy in Nigeria's Territorial Waters", Journal of Korean Institute of Navigation and Port Research, Vol. 39, No. 2, pp. 89-97.
- [2] Becker, G. S.(1968), "Crime and Punishment: An economic approach", Journal of political economy, pp. 169-217.
- [3] Beckman, R.(2012), Cooperation to Combat Piracy in Southeast Asia, Draft Paper for International Seminar on the Law of the Sea in 2012.
- [4] Begg, D., Fischer, S., Dornbusch, R.(1984), Economics. England, Mc Graw-Hill Limited.

- [5] Bowden, A.(2011), The economics of Piracy. Pirate Ransoms & Livelihood off the coast of Somalia. Geopolicity's.
- [6] Bowden, A., Hurlburt, K., Aloyo, E., Marts, C. and Lee, A.(2010), The Economic cost of piracy. One Earth Future Working Paper.
- [7] Brandon, John J.(2000), High-seas Piracy is Booming. It's Time to Fight Harder. Christian Science Monitor. 27 December.
- [8] Bulkeley, J. C.(2003), "Regional Cooperation on Maritime Piracy: a Prelude to Greater Multilateralism in Asia?", Journal of Public and International Affairs. Vol. 14.
- [9] Chang, D.(2010), "Piracy Law and the Effective Prosecutions of Pirates", Boston College International and Comparative Law Review, Vol. 33, Issue 2, Article 3.
- [10] Choi, S. Y., Lee, Y. C., Hong, S. Y and Park, J. K.(2005), "A Study on the Legal Liabilities and Countermeasures against Piracy", Journal of Korean Institute of Navigation and Port Research, Vol. 29, No. 1, pp. 43-58.
- [11] Fiorntini, G., Peltzman, S.(1995), The economics of Organized Crime. Cambridge University Press and CEPR.
- [12] Gerts, M. G., Gould, L. C.(1995), "Fear of Punishment and the Willingness to Engage in Criminal Behavior", Journal of Criminal Justice, pp. 377-384.
- [13] Helmick, J. S.(2015), Maritime Piracy and the Supply Chain. Maritime Logistics and Security Program, United States Merchant Marine Academy.
- [14] Jeong, W. L.(2012), " A Study on the Development of Analysis Model for Maritime Security Management", Journal of Korean Institute of Navigation and Port Research, Vol. 36, No. 1, pp. 9-14.
- [15] Kaplan, R.(2009), Anarchy on Land Means Piracy at Sea, New York Times, April 11, 2009.
- [16] Kaprove, S. C.(2013), The Law and Economics of Piracy at Sea, Piracy at Sea, WMU, 2013.
- [17] Kontorovich, E.(2012), The Penalties for Piracy: An Empirical Study of National Prosecution of International Crime, Northwestern University School of Law.
- [18] Lee, E. B, Yun, J. H.(2005), "A Study on the Enhancement of Maritime Security in Korea Maritime Jurisdiction", International Journal of Korean Institute of Navigation and Port Research, Vol. 29, No. 7, pp. 623-630.
- [19] Leeson, P.(2009), Piracy, economics and the law, CIP Report.
- [20] Machin, S., Meghir, C. (2000), "Crime and Economic Incentives", The Institute for fiscal studies, wp 00/17.
- [21] Madsen, J. V., Seyle, C., Brandt, K., Purser, B., Randall, H., and Roy, K.(2013), The state of Maritime Piracy 2013, Oceans beyond Piracy Report.
- [22] Mbekeani, K. K., Ncube, M.(2011), "Economic Impact of Maritime Piracy", Africa Economic Brief, Vol. 2, Issue 10.
- [23] Menefee, S. P.(1986), Terrorism at Sea-The historical development of an International Legal Response. Paris, International Chamber of Commerce.
- [24] Miceli, T. J.(2007). "Criminal solicitation, entrapment, and the enforcement of Law", International Review of law and Economics, pp. 258-268.
- [25] Mukherjee, P. K., Mejia, M. Q., Xu, J.(2009), Ergonomics, Economics, and the Law: The international regime of Maritime Security, Malmo, Sweden, WMU Publications.
- [26] Noble, R. K.(2010), Conference on Maritime Piracy Financial Investigations. Welcome address by Noble, INTERPOL Secretary General.
- [27] Noh. S. D., Kim, C. S., and Park, S. H.(2012), "A Study on the Countermeasures for Securing Safety of Ship from Piracy Attacks", Journal of Korean Institute of Navigation and Port Research, Vol. 36, No. 4, pp. 273-278.
- [28] Roach, J. A.(2004), "Initiatives to enhance Maritime Security at Sea", Marine policy, pp. 28,41-66.
- [29] United Nations Convention on the law of the sea(UNCLOS), Retrieved June29, 2010, from the World Wide Web: <http://www.un.org/Depts/los/index.htm>.
- [30] Wallis, K.(2010), U. S. ransom ban could drive up premiums. Lloyd's List, 29 April 2010.
- [31] Xu, J.(2010), Law and Economics of Maritime Security, Unpublished lecture handout, World Maritime University, Malmo, Sweden.

---

Received 11 September 2015

Revised 27 October 2015

Accepted 27 October 2015