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MESSAGE FROM THE CHIEF OF NAVAL STAFF

'Bismillahir Rahmanir Rahim'

It is, indeed, a great pleasure for me to see the fourth publication of 'Navy Journal 2018' with its literary brilliance. The delicate radiance of professional skills is magnified by the intellectual pursuit of a bunch of naval officers with their resourceful creative capabilities. I believe such creative effort will help to broaden their literary horizon and solidify their ingenious writing skills.

Following the glorified War of Independence in 1971, Bangladesh Navy has come a long way to become a three dimensional navy inculcating the cherished dream of the great architect of Liberation War and the Father of the Nation Bangabandhu Sheikh Mujibur Rahman. We are now pledge bound to ensure its sustainable development commensurate with the changing technology and challenges of this modern era.

Under the dynamic leadership of Honourable Prime Minister Sheikh Hasina, Bangladesh Navy is now equipped with sophisticated hardware and remains always vigilant for facing the challenges of 21st century. The valiant naval personnel with indomitable valor are committed to ensuring safe usages of sea area for the smooth running of national economic activities. They are working hard to safeguard the vast sea area against piracy, human trafficking, smuggling, protection of biodiversity of coastal areas and so on. Besides, they have been making supreme sacrifice in the international arena for peace building activities under the banner of United Nations. I am confident that Bangladesh Navy will be more capable to safeguard our motherland and will play a vital role towards sustainable development of our growing economy in the days ahead.

A professional magazine is a suitable media for the outward manifestation of such activities. I hope that the 'Navy Journal' will fulfill this very important requirement and continue to provide this facility of expression to the potential officers of Bangladesh Navy. I would like to extend my sincere thanks to the accomplished writers who have contributed valuable articles to take this journal to its professional height. I firmly believe this publication will entail inspirations for the young generations to enrich their creative faculty.

May the Almighty Allah endow His divine blessings for all of us.

AURANGZEB CHOWDHURY

Admiral

Chief of the Naval Staff

EDITORIAL

The 4th publication of Navy Journal 2018 portrays illustrating thoughts and diversified ideas of naval professionals amidst their round-the-clock busy schedule. The sincerest effort and unequivocal devotion of the writers have furnished the journal with its highly literary excellence. The research oriented thought provoking write-ups mingled with the ideas of modern technology, I believe, will be able to satisfy the unquenchable thirst for the development of transcendental intellectual pursuit of our esteemed readers.

Laden with the invaluable articles, the journal is expected to entail a lot of intellectual benefit that will enable the readers to extract sublime tranquility where the lucidity in style, simplicity in language and the articulating usage of dictions are concerned. The prolonged experience of professional naval personnel conferred multidimensional issues that will help the next generations to modernize our beloved navy with latest platforms emanated from modern sophisticated technology of the era.

Despite the sincere effort of our brilliant professionals, we are lacking in respect of our self expertise for flawless publication of this journal. It would be our humble submission to the esteemed critics for any unintentional mistakes so as to create a room for further improvement. However, I should put forward to confer all credits to the editorial staffs and contributors for their laborious effort.

The editorial board remains ever grateful to the Chief Patron Rear Admiral M Shaheen Iqbal, NUP, ndc, afwc, psc for his valuable advice in publishing the journal in a befitting manner. I should also mention the rigors and benign support of all members of the editorial board behind this publication.



A S M AKHTER HASSAN

Captain BN

Director of Naval Education Services

Naval Headquarters

Banani, Dhaka-1213

MARITIME SECURITY DOMAIN OF INDIAN OCEAN : GOALS AND PRIORITIES

Commodore Mir Ershad Ali, (G), NPP, psc, BN

Prophecies

‘Whoever controls the Indian Ocean will dominate Asia, the destiny of the world will be decided on its waters.’ - **Alfred T. Mahan**

‘The Indian Ocean would become “center stage” for the twenty-first century global geopolitics’. - **Robert D. Kaplan**

Geo-strategic and Economic Significance of Indian Ocean

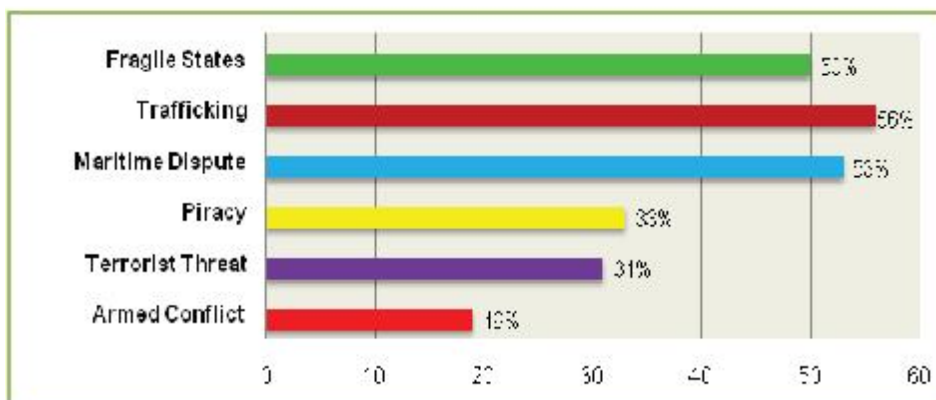
Mahan and Kaplan, one postulated the importance of Indian Ocean (IO) in 18th century and the other in the contemporary times, echoed similar prophecies on IO. Both the prophecies underscore the fact that IO has the greatest strategic and economic value being the smallest of the world’s mighty oceans. Its waters cover 70 million square kilometers, about 20 percent of the world’s water surface. The pan Indian Ocean region has thirty six littorals, one-third of the world’s population, one-fourth of the global landmass, and three-fourths of global reserves of oil, iron and tin. Just ten countries of the Indian Ocean littoral have about 65 percent of the world’s oil reserves.

Indian Ocean acts as a ‘transit lounge’ for international shipping and contains world’s vital International Sea Lanes (ISL) that are crucial for seaborne trade and global economy. Over 100,000 ships cross the IO through those ISLs every year. These lanes are generally close to the landmass and are marked by major chokepoints — such as the Straits of Hormuz, the Bab El-Mandab in the West and the Malacca, Sunda, Lombok Straits in the East. Through these chokepoints pass the world’s major oil tankers carrying hydrocarbon resources from the Gulf to major consumption centers across Asia, also forming a large portion of global trade. Emergence of ‘Blue Economy’ concept in the IOR has also revitalized the ventures of the littorals in the maritime domain manifolds. With the exponential growth of population and depletion of land resources at the same time, even traditionally ‘sea blind’ nations in the IO have started looking towards the sea as source of food and energy.



Maritime Security Dynamics - Perspective on IO

Traditional Security Concerns. In terms of security and stability, the Indian Ocean region is unstable, and has often been referred as the “arc of crisis”.¹ Some statistical data pertinent to major security concerns in the IOR are shown below which has the spin-off effect on the traditional maritime security of the entire IO region² and may escalate to closure of ISLs, impede freedom of navigation, sanctions and blockades, or even to large scale military conflict :



- a. 19 percent of the countries in the region are experiencing varying degrees of involvement in armed conflict.
- b. 31 percent of countries have varying degrees of terrorist threat to their country including sea areas.
- c. 33 percent of countries are threatened by piracy in adjacent international waters or armed robbery at sea inside their own territorial waters/EEZ.
- d. 53 percent of all countries still have persistent maritime disputes with neighbouring states.
- e. 56 percent of all countries in the region are threatened by the endemic problem of illicit trafficking of arms, narcotics and people.
- f. 50 percent of the fragile (failed?) states are located in the IOR alone.³

The security dynamics in IO, therefore, can be described as fragile with high potentials of inter-state conflict. This has resulted in a perennial conventional arms buildup, increasing militarization, exorbitant military expenditure and most alarmingly, nuclearization.

Vulnerability of ISLs. The increased use of the Indian Ocean's ISLs makes them vulnerable to regional instability, spillover violence from regional conflicts, and the actions of pirates, terrorists, and criminal organizations. Furthermore, most of the strategically important SLOCs and maritime choke points are adjacent to failed states and areas with weak governance systems. Therefore, possibility ranging from 'Guerre de Course' to disruption is perpetually prevalent in the IO region, with no viable alternative shipping routes available.

Non-traditional and Asymmetric Security Concerns. Non-traditional and asymmetric maritime security threats in the IOR have a wide ambit ranging from maritime terrorism to IUU fishing. These non-military threats are predominantly

1. Growth of Naval Power in the Indian Ocean : Dynamics and Transformation, W. Lawrence S. Prabhakar, National Maritime Foundation, First Published in 2016.

2. Amit A Pandya, Maritime Commerce and Security : The Indian Ocean, (A Paper Published by Stimson, Washington, DC, February 2011).

3. https://en.wikipedia.org/wiki/List_of_countries_by_Fragile_States_Index#cite_note-FSI2013-9

cross boundary criminal activities with sea extensions and are interlinked. The evil nexus of radicalism, terrorism and insurgency aggravated by narcotics, piracy, smuggling, human trafficking and gun-running weakens government architecture and creates a perpetual state of anarchy and chaos. It might invite military intervention from home and abroad like we have seen in the Gulf of Aden.

Environmental Security Concerns. The Indian Ocean littorals feature nearly 40% of Asia's four billion inhabitants living within 100km of the coastline. Climate Change resulting in unpredictable cyclones, floods, and tsunamis in the Indian Ocean Region has perilous impact on the littorals. The effects of sea-level rise are already causing flood, inundation, soil erosion, saline intrusion, etc in the low-lying coastal areas of the littorals. Studies undertaken by military and academics suggest that climate change is likely to aggravate "inter-state" and "intra-state" competition even war in the region over natural resources, specially water.

Human Security. Most of the above factors also led to the deterioration of human security in the broad IO. This acts as contributing factors for many traditional and non-traditional security challenges as well.

Evolving Security Order in IO

The IO region hosts a number of hotspots with ideological fault lines that seriously impact the regional geopolitics. Power vacuum in the Post-Cold War era has gradually diminished by the increasing footprints of extra-regional powers in the IO, emerging into a complex multi-polar setting. Owing to its geo-strategic-economic disposition, jostling among regional and extra-regional maritime powers for influence in the region persists.⁵

Emerging and established great powers – most notably the US, China, and India –are bolstering or establishing strategic footholds in the Indian Ocean

4. The Maritime Future of the Indian Ocean, Putting the G back into Great Power Politics - The Hague Centre for Strategic Studies, Future Issue No 13 | 09 | 10

5. Maritime Security in the Indian Ocean: Convergence Plus Cooperation Equals Resonance by G.S. Khurana.

region. China's 'Belt and Road' and 'Maritime Silk Road' initiatives, India's local sheriff's role 'guided' by the US and continuation of the US as the strategic anchor and security provider are striking features of the current IO security order. France and the UK are the last of the European powers still trying to hold the ground in the IO with residual presence. Other notable countries like Australia, Iran and few others are also aspiring to establish foothold beyond national maritime jurisdiction with elusive purpose and objective.



Maritime Cooperation

An ocean with unprecedented ethno-cultural and ideological divides coupled with diverse strategic paradigms understandably impairs the willingness of the littorals to engage multilaterally. Most nations of IOR are willing to cooperate for non-traditional security construct. Beyond that, it is perceived as threat to strategic autonomy and, therefore, it is not the priority. Moreover, the width of IO makes one's problem further from others or at times one's problems become 'Schadenfreude' for the other. Notwithstanding, guided by the quest for economic development, a positive trend is visible today to form unanimous endorsement of cooperation among countries to preserve the freedom of the seas. There is also an increasing trend for the smaller (comparatively) nations to bind together for common good as a counterbalance under some form of cooperative construct.



Probably, Indian Ocean has the most number of regional cooperative bodies operating right now. These include SAARC, BIMSTEC, IONS, IORA, GCC, Arab League, WPNS, ReCAAP, ASEAN and few more. Most of the bodies have overlapping jurisdictions. There are also multiple bilateral, tri-lateral or even quadrilateral constructs prevalent. Such diverse arrays of cooperative mechanisms also raise debates between the proponents of 'inclusive versus regional exclusiveness' and 'bilateral versus multilateral' construct. The key to all these forms of maritime cooperation lies in the convergence of interests thereby, achieving a resonance against the symbiotic collusion amongst various non-state actors, thus pitting 'one convergence against another'.⁶

Maritime Goals and Priorities

Maritime goals and priorities of the IO littorals are definitely diverse, yet there are obvious areas where convergence of interests can be identified to achieve resonance. Cooperation leading to those shared interests also lies in realizing the exigency to field concerted efforts against various non-state actors. Considering the perceived threats and challenges, maritime security goals and priorities of the IO littorals can be summarized as follows :

- a. **Maritime Governance.** Reaping economic benefit through good governance and management of the maritime realm is a prerequisite for all IO littorals. Fundamental objective of the maritime governance is to macro manage the maritime affairs, instituting policies and strategies, infrastructures, legal framework, and many others. IO littorals are relatively lacking in the governance aspect that impair sustainable maritime development.

⁶. Khurana, op. cit.

b. Maritime Trade Security. SLOC protection and unimpeded Maritime Trade Operations (MTO) can be perceived as a top priority interest for the IO littorals. Any hindrance to flow of seaborne trade will have regional implications, may even lead to large scale conflict.

c. Freedom of Navigation (FONOP). UNCLOS III regime has codified the rights of freedom of navigation and overflight in the High seas and also transit passage in the straits. Violation of this right is likely to cause rising tensions, as is the case in the South China Sea and the US effort to preserve mare liberum through FONOP.

d. Maritime Domain Awareness. Conducting surveillance in the vast expanse of the maritime area of jurisdiction is a daunting task, yet adequate and timely response to the evolving threat demands effective surveillance. A better framework would be establishing Pan IO Maritime Domain Awareness setup.

e. Counter Terrorism. Terrorism using the maritime medium predominates as a traditional security threat. Such threats must be responded with enhanced Maritime Domain Awareness and maritime intelligence that would coordinate land and sea assets with surveillance, identification, interdiction and elimination.

f. Constabulary Functions. Maintenance of good order at sea is a primary requirement for all littorals to deter and check all kind of illicit activities. Failing to do so would lead to chaos in the maritime domain with severe socio-economic consequences.

g. Maritime Search and Rescue (MSAR) and Humanitarian Assistance and Disaster Relief (HADR). Nature has its own ways of sending IO signals for greater inter-operability, shorter response times and ability to be ready to respond with assistance when she shows her fury. The Eastern IOR littorals and the Indian sub-continent are especially prone to frequent devastation by cyclones, earthquakes and tsunamis. Growing incidents of maritime disaster and accidents require effective and quick SAR and HADR efforts.

h. Peacekeeping Operations. Serving the humanity by participating in the Peacekeeping Operations under the UN sanction should also be important goal of the IO littorals. Peacekeeping in the maritime arena is complex and daunting. Maritime Troop Contributing Countries (TCC) needs to bring in proper capacity to function effectively in such challenging conditions.

j. Blue Economy. As noted earlier, the growing demand of food and energy has forced the littorals for sea ventures across the IO. Yet, the dream remains elusive due to lack of technology for many of the developing nations. Cooperation in operationalizing blue economy, therefore, is becoming a priority for the littorals of the IO.

Capability of IO Navies ⁷

Despite the importance of the maritime domain, maritime capacity building of regional countries is continuously challenged as only few countries of the IO are purely maritime. Instead, most of them face continental vs maritime duel. The land centric issues, in many cases, restrain investment in the maritime domain. The continental mindset also impairs the progressive development of the navies to perform their role as the net security provider in the maritime domain.

Geography restricts maritime forces' application. Most of the IO navies are small burdened with colossal responsibilities and limited resources. Sea efforts of IO navies are mostly confined to EEZ patrolling and, therefore, they lack eyes at sea in true sense. Some like Indian Navy has wide sea and satellite surveillance capabilities but rest of the IO navies are yet to receive its dividends through partnership. So, to combat transnational threats they are neither fully self-sufficient nor meaningfully engaged in any partnership.

Due to the evolving maritime threats the navies of IO, today the navies find themselves in a confounded territory balancing between the traditional and non-traditional roles. This is due to irreconcilable contradiction between the

7. In stances where there is no formally constituted 'Navy', the term shall automatically mean the designated principal agency responsible for maritime security.

‘Westphalian character of the navies’ and the ‘maritime globalization’.⁸ IO navies’ operational attributes today range from active cooperation in one exigency to latent competition in another, even while preparing for the *raison d’être* of all navies – to be able to prosecute a war when required and prevail.

Budgetary constraint is probably the predominant handicap (Grain vs Butter Syndrome) for the capacity building of the IO navies. At present, only few countries spend in double digit billion dollars in the IO for defence. India spends the maximum and, therefore, the most capable in terms of strategic deterrence, sea control, projection of power and naval presence. China, Australia and Japan falls into the category of green water navies, who have the capability to secure sea control in limited time and space. Other littorals of IO are mostly brown water navies capable of performing coastal defence and constabulary functions of varying degree.

Capacity Building Requirements

Specific capacity building requirements of the IO littorals obviously vary as ‘one size doesn’t fit all’. However, some generic requirements can be prescribed that are essential for all the navies in the IO, the essence being ‘collaborative and cooperative approach’ to address shared security challenges. Maritime security discourse is not just military defence, which means capacity building of the stakeholders other than defence is also crucial requirement.

To start with different existing maritime forums in the IOR could identify essential capacity building interfaces by establishing “Expert Working Group”. Information sharing and interoperability is the cornerstone which can be achieved by regional or sub-regional institutional setup. Maritime Domain Awareness by resorting to cooperative surveillance is another essential interface. Multi-lateral exercises, academic discourses, Subject Matter Expert Exchange (SMEE), etc are also necessity. Material support from the capable countries in the form of funding, technology transfer, assistance for indigenization and self-reliance would serve as the key to achieve end state capability by the weaker states.

8. Sinsunwal. Sharad, *Maritime Affairs: Journal of the National Maritime Foundation of India*, Vol 8, Issue 1, 2012.

Concluding Remarks

IO will continue to enjoy eminence in global stage and be an arena of complex matrix of cooperation and competition. However, no single littoral in the IO has the capacity to address the maritime security challenges alone because they have simply become wide in spectrum, complex in nature and has no boundary to limit. On the other hand, every IO littorals share many things in common, so are their worries and woes. Therefore, a holistic and layered multilateral regional cooperation is the only way ahead. States also need to focus on their maritime goals and priorities leading to formulation of appropriate policies and strategies. Littorals also need to prioritize maritime capacity building to establish safe and secure regime at sea in collaboration with regional navies. Existing regional cooperative bodies like IONS, IORA, ReCAAP etc may also take lead to foster cooperative engagement. Such efforts will pave the way to sustainable development of maritime economy for the benefit of all littorals of IOR. Maritime synergy is the key.

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Biography of the Writer



Commodore Mir Ershad Ali, (G), NPP, psc, BN

was commissioned on 01 Jul 1989 in the Executive Branch of Bangladesh Navy. He has attended various courses at home and abroad. He did Naval Officers' Basic Course from Germany and Gunnery Specialization Course from India. He is a graduate of Defence Services Command and Staff College, Mirpur and obtained Masters in Defence Studies

(MDS) obtaining first class from the National University, Dhaka. He is also an alumnus of the German Staff College (Führungsakademie der Bundeswehr), where he was adjudged to be the best officer of the course and was awarded the prestigious 'Scharnhorst Award', first instance of such award to any student from Asia and from the Navy. Commodore Ershad is also a Fellow of the National Intelligence University of the USA.

Commodore Ershad held a blend of command and staff appointments. He served in different capacities in Naval Headquarters, onboard various ships and establishments of Bangladesh Navy. As his career in the navy progressed, the officer commanded five different types of frontline ships including the flagship of Bangladesh Navy, BNS BANGABANDHU and served as Directing Staff at the Defence Services Command and Staff College. He also served in Ivory Coast as UN Military Observer.

Commodore Ershad is the recipient of 'Navy Efficiency Medal' and the 'CNS Commendation' (twice) for his excellence in Naval Service. In addition to his present appointment as Director of Naval Operation (DNO), he is also appointed as the Director Multi-national Operations (DMNO) and Director Staff Duties and Ceremony (DSD&C).

The Commodore is an enthusiastic golfer, avid reader and is keen about technology. Academically, his area of interest is about the Maritime Security of the Indian Ocean on which he has contributed a number of articles published at home and abroad. Commodore Ershad is married to Mrs Sharmin, who also pursues an excellent career in the entrepreneurial venture as Director of a Readymade Garments Industry. The couple is blessed with two sons, Tawseef (19) and Yashfeen (12); both are passionate about basketball.

GROWING TREND OF INDIVIDUALISTIC CULTURE : NEED TO REVIVE ESPRIT-DE-CORPS

Captain M Mosayed Hossain, (TAS), BCGM, afwc, psc, BN

Introduction

In pursuit of modern life, traditional social institutions and norms, like youth forum, literature club, writer's forum, sports clubs, collectivist and communal culture etc are diminishing from youth's likings. Mobile, internet, facebook, television (TV) and multimedia assumed greater preference. Traditional values that help to lead a disciplined and routine life are fading away. Television channels and internets have rather forced away the routines from life. As a whole we are no more living in a society based on moral and ethical values, strong communal and family bonding. Individualism, personal gain and privileges dominate our social values in different tiers in different forms. Many of these developing trends have affected our sailor behavior, naval culture or values and the organization as a whole.

Naval personnel are oathbound to sacrifice their lives for the country. In no other profession, demand from an individual is of such extreme magnitude. The climax of war demands a sailor to ignore his own life. It demands a faith and a conviction that his life is destined for a cause greater than his personal one. The harsh sea life and tragic naval war domain demands dedication, sharing, unity of efforts, as a whole the naval culture of "we not me" or the attributes of "Esprit-De-Corps". With the technological development and changing socio-cultural norms, the noble dimension of naval bondages-belongings or Esprit-De-Corps is being challenged.

Aim

The aim of this paper is to highlight the effect of growing culture of individualism and propose counter response approaches to bring positive influence on Esprit-De-Corps.

Growing Individualism Culture and Concerns

Various factors emanating from modern socio-cultural complexities are blurring the traditional naval values, group spirit or Esprit-De-Corps and naval collectivist cultural environment. Mobile, internet, facebook, TV and multimedia have contributed to develop the individualistic culture. People in collectivist cultures, compared to people in individualist cultures, are likely to define themselves as aspects of groups, give priority to in-group goals, focus on context more than the content in making attributions, define most relation-ships with in-group members, make more situational attributions and tend to be self-effacing. The growing trend of individualism is affecting the traditional naval collectivist cultural environment. The traditional naval bondages between various ranks and files, trust and belongingness and the harmony between various parts of naval organization are weakening due to the growing individualism culture of naval personnel.

The naval personnel in individualistic culture are not likely to define themselves as aspects of groups and show any concern about the effects of actions or decisions on others. They are less likely to show sharing attitude and willingness to accept the opinions and views of others. They are less bothered about self-presentation and loss of face. They may not believe in the correspondence of own outcomes with the outcomes of others and feeling of involvement in and contribution to the lives of others. Individualists show less concern, sharing, and so on than collectivists, which does not conform to the naval culture or values. It is, therefore, necessary to revive the collectivists' naval culture, the values and ethos of "Esprit-De-Corps" to overcome the negative effects of individualistic trends.

Addressing the Negative Effects

Developing Ethical Command Climate. A strong and ethical command climate is the ultimate guard against the development of unethical practices emerging from negative socio-economic dynamics. The leaders of the organizations are solely responsible for the organization's command climate.

A command climate is set by the leaders' belief, expression and action because under command observe their leaders and follow the examples they set. Leadership attributed with character, competence and courage of conviction will be the key to develop and maintain this desired climate. An ethical and effective command climate prevails when actions conform to the words, mutual trust exists between the leaders and the led and finally people feel contented and secured in collectivist cultural and organizational environment.

Leadership Approach. In this modern era it is very difficult to ensure the traditional naval bondages, spirit of collectivism, naval aspects of group goals and unity of efforts. A leader has to pursue the collectivist culture, the naval culture of we not me; and also encourage his followers for the same.

Practising Traditions and Values. Traditions and beliefs, values and ethos are the binding force of an organization. Naval traditions and values must be displayed and upheld at any cost. This can be better achieved by appropriate vision, directions, required guidelines formulation and dissemination of the same. It requires motivated, committed and involved leadership to implement the same. For effective implementation COs/OCs need required time and space to conduct professional and regimental activities. It can be achieved by respecting the command channel by all echelons. Besides, all personnel of the ship/Estb should follow the traditional naval values and ethos in letter and spirit.

Instilling Mentoring Culture. Mentoring is a powerful personal development and empowerment tool. It is an affiliation between the leaders and the led which develops based on mutual trust and respect. "Mentoring is to support and encourage people to manage their own learning in order that they may maximize their potential, develop their skills, improve their performance and become the person they want to be."¹ Leaders need to equip themselves with the knowledge of mentoring to develop their under command in order to achieving sustained growth of professionalism, courageous and worthiness of the outfit he belongs to.

1. Parsloe, Eric and Leedham 2009, Coaching and Mentoring : Practical conversation to improve learning kogan page limited, London.

Instilling Naval Traditions and Culture. The traditions and culture decorated the naval service with glory and funneled naval personnel into the rank. There are few formal training modules in training curriculum of New Entry Sailor. They learn fundamentals of the naval traditions and the traits for putting them into practice. Most important time for a young sailor is perhaps during the early days at ships/units while undergoing regimentation. When he can be allowed to handle small events by himself under supervision. There, the young sailor apprentice can learn by doing the things himself. Moreover, he also has ample chance to learn by observation, by observing the seniors. Unfortunately, not much such opportunity is offered to the young sailors in present day working environment at many ships/units. The cultures of organizing social events, cultural programs, reunions etc by traditional naval ways and means are now replaced by the culture of outsourcing or event managements. Therefore, creating ideal environment and providing Ships Company with adequate opportunities is becoming vital for bringing by sailing virtues into naval personnel.

Revive Sailing Culture and Practices of Esprit-De-Corps. Traditional sailing norms, culture and values must be upheld and practised to prevent ingress of individualist trends. The professional quiz competitions, jubilant games and sports environment and rewarding competitive sports culture, vibrant cultural cohesion, priority in group goals and laudable state of naval belongingness need to be recuperated to prevent the growing individualist culture. In addition, non-professional tasks, non-naval extravagance, outsourcing and corporate malpractices should be avoided to nurture glorious attributes of Esprit-de-corps and make sailing cultural more dignified. The social and cultural events of units/ships/bases are to be organized and presented by dignified contributions of concern ships and proud participations of their ships company. Ways and means of motivation and mentoring currently in vogue in the navy may be customized to meet the requirements of traditional Navy. Every individual should be made accountable for his/her sense of duty, behavior, belongingness and conduct. Finally, partnership between mentor and mentee, strong bondages between leader and the led and motivated, committed and involved

sailors are mandatory to implant the collectivist naval culture, attributes of group spirit or the Esprit-De-Corps.

Conclusion

Naval services have a reputation for excellence, a strong reflection of collectivist cultures and Esprit-De-Corps of its sailors and officers. The naval attributes of self-sacrificing, dedication, honesty, loyalty and belongingness have always been admired and well appreciated. This reputation derives from and depends upon unequivocal commitment, self-sacrifice and mutual trust. The changing socio-economic dynamics and pursuit of modern life engrossed with mobile, internet, facebook, TV and multimedia have affected the naval collectivist culture, sailing norms and reputation. The dynamism and adaptation to changes will be the key to our organizational development.

Biography of the Writer



Captain M Mosayed Hossain, (TAS), BCGM, afwc, psc, BN joined Bangladesh Navy on 01 Jan 1989 and was commissioned on 01 July 1991 in the Executive Branch. He is a TAS (Torpedo Anti-Submarine) specialist officer. He has attended Junior Staff Course in Italy, Defense Services Command and Staff College Course at Mirpur and Armed Forces War Course at NDC, Dhaka and Harp Academy, Istanbul, Turkey. He has obtained Masters in Defense Studies (MDS) from the National University Bangladesh, Diploma in War Studies and Joint Operations from Turkish Armed Forces War Colleges and completed M.Phil. (Part-I) from Bangladesh University of Professionals (BUP). He also attended Leadership Course, Application of the International Mine Action Standards (IMAS) course and Maritime Security Desktop Exercise (MSDE) conducted by Royal Military Academy Sandhurst, Geneva International Centre for Humanitarian Demining (GICHD) and Indonesian Maritime Security Agency (BAKAMLA) respectively. Captain Mosayed had a good mix of command, instructional and staff appointments. He served in different capacities in various ships and training schools of Bangladesh Navy including BNA and OSTG. He has commanded BNS TANVEER, MOHIBULLAH, JAMUNA, S R AMIN and served as OIC in BN UNCELL and FIS, Chittagong. His instructional appointments include OIC TAS School, TC BNS ISSA KHAN, Director JSC and SGO, OSTG. As Staff officer he served in GSO-3 and GSO-2 appointment in the then CIB (Special Ops), HQ DGFI and as SO (O) and CSO to COMKHUL. He served the United Nations Mission as Contingent Member of BANENGR-3 in South Sudan and as naval representative in the delegation team; he attended the first US-BD Defence Dialogue and BD-INDIA Training Meet. His hobbies include travelling and sports. Captain Mosayed is married and blessed with a daughter and a son. Presently, he is serving in Bangladesh Coast Guard Force as Zonal Commander, Coast Guard Force South Zone.

SHIPBUILDING INDUSTRY FOR BANGLADESH : AN OPPORTUNITY TOWARDS SUSTAINABLE ECONOMY

Captain M Atiqur Rahman, (G), afwc, psc, BN

Introduction

Global seaborne trade has expanded on an average by 4 per cent every year since 1970. At this pace, global seaborne trade is expected to increase by 36 per cent in 2020 and double by 2033. (UNCTAD 2012: 22). In 2010, about three quarters of import growth of developing economies took place in East and South Asia. The economic growth of China, India, Bangladesh, Myanmar, Thailand and other Asian countries has increasing demand of maritime trade through the Bay of Bengal (BoB). Maritime trade of Bangladesh is also growing substantially.

Chittagong port was the center of building ocean going vessels in the middle of the 15th to 17th century. The entire fleet of Sultan of Turkey was built at Chittagong. British Navy also built ships at Chittagong for the famous battle of Trafalgar in 1805. However, presently, only few shipyards like Western Marine Shipyard (WMSL), Khulna Shipyards, Chittagong Drydock, Ananda Shipyard are building new ships.

There are more than 300 shipyards in Bangladesh that mostly serve domestic demands of various types of inland shipping. Bangladesh entered into export market of new ships in 2008 when Anada Shipyard handed over a 2850 DWT ships to Denmark. Western Marine Shipyard Ltd (WMSL) also exported two 5200 DWT cargo ships to German buyer in 2010. By 2015, these two shipyards delivered 17 ships with a value of \$126 Million (Azam 2015:58). The ships are mostly Multi Purpose Dry Cargo Vessels (MPC) and Ferries.

There is substantial demand of new ships of different categories in the world market. Global shipbuilding trends reveal that the hardworking and cheapest labour, geographical and hydrological features of Bangladesh can be capitalized in shipbuilding for domestic and international market for sustainable economy.

Global Shipping Trends

Maritime Trade and World GDP. In 2014, the world gross domestic product (GDP) increased marginally by 2.5 per cent up from 2.4 per cent in 2013 (UNCTAD 2015). Meanwhile, world merchandise trade has increased by 2.3 per cent. Additions to volumes exceeded 300 million tons taking the total to 9.84 billion tons.

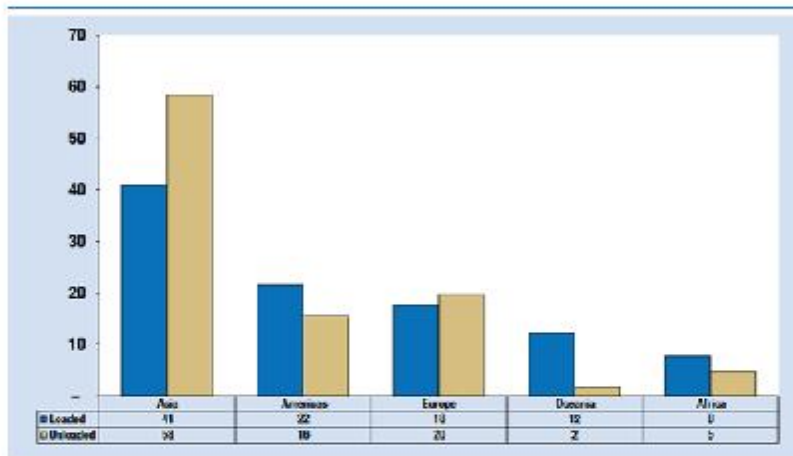


Figure 2 : World Sea borne Trade by Region - 2014

Source : UNCTAD Review of Maritime Transport, 2015

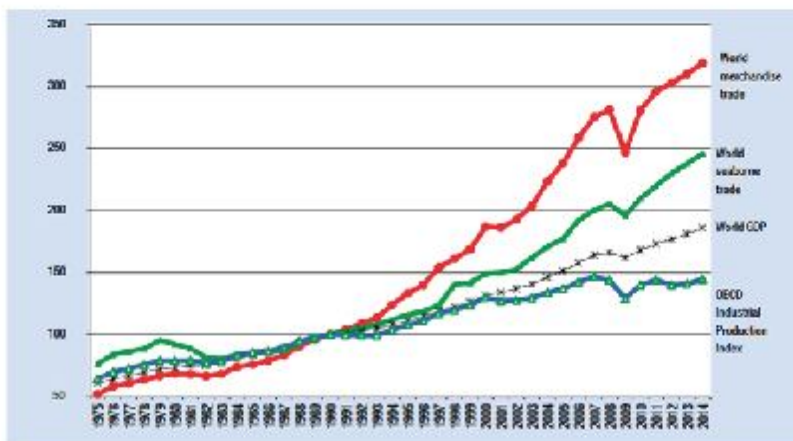


Figure : Correlation of Maritime Trade with World GDP

Source : UNCTAD Review of Maritime Transport, 2015

Maritime Trade of Bangladesh

About 80 per cent export, 100 per cent import of garment items, 100 per cent import of Petroleum and lubricant (POL) are traded through the sea. Dhaka-Chittagong and Dhaka-Mongla corridor contributes 30 per cent of GDP due to sea port. Maritime trade of Bangladesh is growing substantially (Figure 5). Bangladesh ports are also essential for Eastern part of India, Nepal and Bhutan as the region has the closest access to the Bay of Bengal.

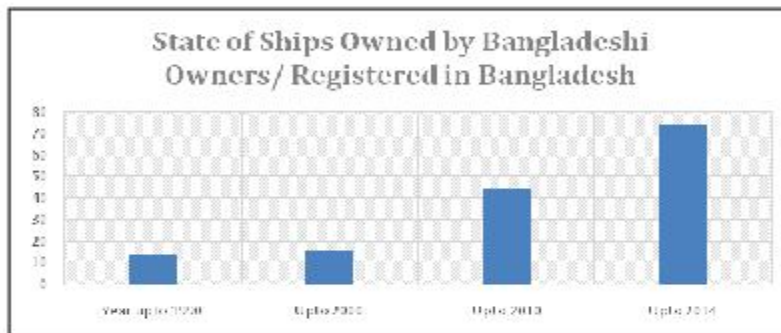


Figure 5 : Maritime Trade Growth of Bangladesh

Source : Prepared by the Author (Data from Department of Shipping)

Global Ship Building

The superiority of east in shipbuilding industry shifted to Europe after industrial revolution. Shipbuilding becomes a European industry in post WWII where Britain took the lead. Thereafter, Japan took the lead from 1960s to 1980s. Japan established herself as number one ship-building nation by manufacturing

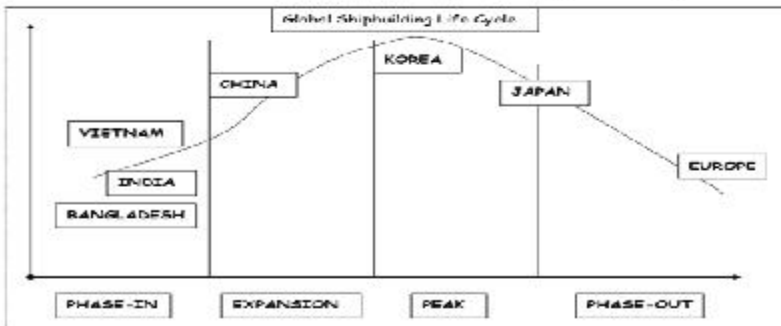


Figure : Shipbuilding Lifecycle around the World

Source : Zakaria et al 2010

oil carriers for the world. In the beginning of 21st century, South Korea took the lead and the world ship-building market moved toward East. Table and figure below shows that in 21st century, rapid growth in market share is observed in China

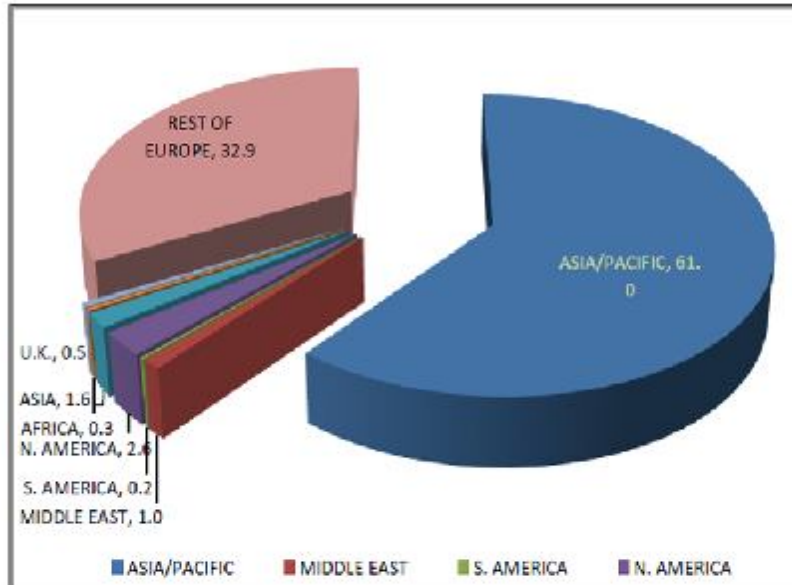


Figure : World Shipbuilding Market Share by Region
Source : IIFC Report 2012

due to cheap labor costs. Vietnam and India are the other emerging forces. Bangladesh has become a new destination for companies seeking construction of small ocean-going vessels as traditional ship-building nations, such as South Korea and China are now focusing on building large ships. Even Vietnam, which is relatively new in shipbuilding, is no longer interested to build small ships weighing up to 25,000 dead weight tones (Quora, 2016). Adding their reluctance has made India and Indonesia the new destinations for small shipbuilding. In fact, emergence of Vietnam is largely a result of efforts by European countries to relocate their ship-building industry to low labor cost countries. India has taken steps to increase ship-building capacity both for defence and commercial sector under its 'Make in India' policy taken in 2014. The government is patronizing national and private shipyard by various incentives to foster shipbuilding through indigenous design as well as by Transfer of Technology.

Table: World Shipbuilding Market Share by Countries - 2015			
Rank	Country	Compensated GT	%
1	 South Korea	2,310,000	41.0%
2	 Japan	1,620,000	28.9%
3	China	1,350,000	24.0%
	Rest of the world	340,000	6.1%

Source : <https://en.wikipedia.org/wiki/Shipbuilding>

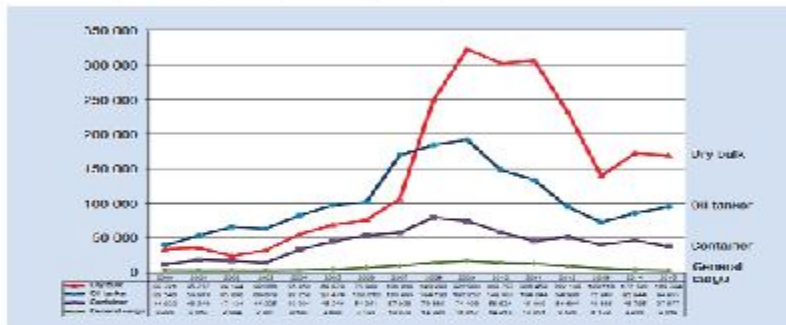


Figure : World Tonnage on Order, 2000-2015 (Thousands of dwt)

Source : UNCTAD Review 2015

With global environmental concern and tougher international shipping regulation, the life span of most of the existing ships is coming towards an end along with extensive repair and inspection requirements which provides significant opportunities for next 10-12 years. Experts say more than 50% of the world's ships are more than 20 years old and need replacing. Globally, this small and medium-sized ship market is worth around \$200 Billion. If Bangladesh can get 1% of this market, then it amounts to \$2 Billion (JBBC Report, 2014).

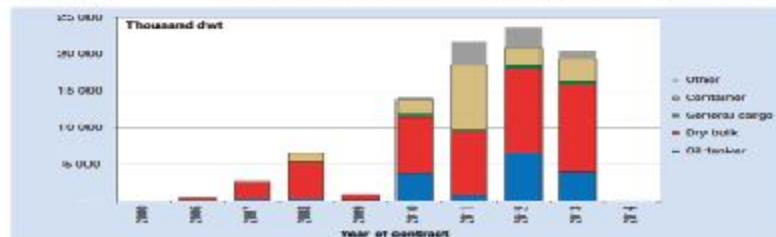


Figure : Contract of Year per Tonnage (dwt) Delivered in 2014

Source : UNCTAD Report 2015

The global economic slowdown has changed the demand situation of different kinds of vessels (Figure 8). During 90's as the trend to container carriers increased, the search for economies of scale led to the introduction of larger vessels. However, this trend is changing rapidly as Asia is having a

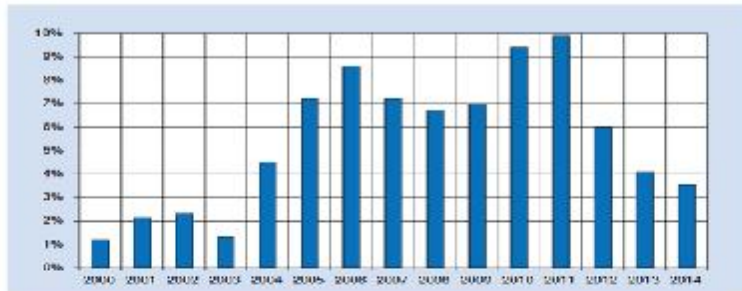


Figure : Annual Growth of World Fleet 2000- 2014 (per cent of dwt)

Source : UNCTAD Review, 2015

better growth performance than Europe and as China is the major supplier of this increased demand. Shipping companies are now focusing more on regional trade with shorter route and relatively smaller vessels for Asia. International shipping companies are also focusing on route sharing to cut their idle capacity. Currently, vessels with 3,000 or less TEU carry 38.2% of the worldwide total container movement of 14 million TEU (IIFC Report, 2012). This percentage is likely to increase in near future with recent global development which provides an upper hand for Bangladeshi ship builders.

Opportunities for Bangladesh

The regional shipbuilding giant Japan and Korea is focusing for hi-tech and larger ship where India, China and Vietnam are building smaller ship. As the economy of China and India is growing fast, it is likely to shift focus to larger ship building. Cheap labour as main competitive advantage, the local entrepreneur's may focus in the shipbuilding segment with less than 15,000 DWT capacities. The existence of our ship breaking industry which is world largest also provides an advantage for the local shipbuilding industry. In the prevailing global scenario, Bangladesh can focus on building small and medium ships for international and domestic markets.

Table. Shipbuilding Contracts Received by Some Major Shipbuilding Nations and Bangladesh

Year	World Total (Vessel number)	China (%)	Japan (%)	Korea (%)	Bangladesh (%)
2000	1950	10.26	23.59	17.95	0
2001	2500	16	20.80	9.20	0.08
2002	2250	11.11	22.22	10	0.00
2003	3100	16.29	22.58	16.45	0.10
2004	3900	20.26	21.79	13.08	0.10
2005	3850	20.78	13.25	12.73	0.03
2006	5050	29.70	14.85	14.85	0.08
2007	6600	33.33	11.21	19.70	0.35
2008	3260	30.00	16.50	13.33	0.52

Source : Journal of Mechanical Engineering, Vol. ME 41, No. 2, December 2010 Transaction of the Mech. Eng. Div., the Institution of Engineers, Bangladesh

As per COMTRADE global shipbuilding market size is US\$ 1,600 billion. If only 1% market share can be captured by Bangladesh, it will be worth US\$ 16 billion. If we can grab 1% of the global order for only small ships market (which is about US\$ 400 billion) the amount will be worth US\$ 4 billion (Quora, 2016). Two leading local shipyards, Ananda and Western Marine received orders to make 41 small vessels worth about US\$ 0.6 billion mainly from European buyers in recent past.

Shipyard Industries of Bangladesh

There are 69 private shipbuilding and repairing yards at various locations of Bangladesh. Most of the shipyards are privately owned and approximately 70% are located in and around Dhaka and Narayangong along the side of the river bank of Buriganga, Shitalakha and Meghna. About 20% shipyards of Chittagong division are located along the side of Karnapuli river and 6% are located along the bank of Poshur river in Khulna division and the remaining 4% are located in Barishal division (Proceedings of MARTEC, 2010).

Some private shipyards have attained international standard to manufacture small size ships up to 10,000 DWT. Bangladeshi shipyards have built ships for Germany, Japan, Denmark, Netherlands, and some African countries (IIFC Report 2012). The prominent private shipyards of the country, Ananda Shipyard and Slipways Ltd and Western Marine Shipyard Ltd have signed contracts of

over US\$ 600 million worth to build more than 40 vessels with capacities below 10,000 DWT and most of them are delivered.

Capabilities of Major Bangladeshi Shipyards

Chittagong Dry-dock Limited. Chittagong Dry Dock Limited is a 100% government owned company presently managed by Bangladesh Navy. This is the largest ship repairing yard with capacity up to 22,000 DWT. The yard has very limited new shipbuilding capacity at present.

Khulna Shipyard. Khulna Shipyard is in operation under the management of Bangladesh Navy, constructing and repairing vessels like Large Patrol Craft, Inland Container Vessel, gun boat, cargo vessels, floating cranes, water barge, water boat, tug, oil tanker, pontoon, LCT, trawlers, launch etc. Its versatile dock facilities can accommodate a good number of ships at a time for repair or new shipbuilding. Khulna Shipyard has credited to built, renovated and repaired more than 2,500 vessels. Khulna Shipyard is currently committed to design and build wide range of new ships up to 5,000 DWT.

DEW Narayanganj. Dockyard and Engineering Work (DEW) Ltd has capability of building and repairing vessels of all types up to 3,000 DWT. Since 2006 it has been run by Bangladesh Navy and refurbished small boats and ships.

Western Marine Shipyard. Western Marine is one of the leading private owned shipyards in Bangladesh capable to build world class ships up to 10,000 DWT. The yard has constructed ocean going vessels for various countries of the world including Germany, Denmark and Finland. The company has a modern ship design section including CNC machine, bending machine etc with internationally reputed software and experts. Western Marine has experience in building vessels like multi-purpose cargo vessels, tug boat, tanker, ferry and pontoon, oily waste collection vessel, passenger vessel etc.

Ananda Shipyard. Ananda Shipyards and Slipways (ASSL) is one of the pioneers of ship building industry of Bangladesh. Ananda has production

area of 80,000 sq meter of which 20,000 sq meters is covered. Its shipbuilding shops are fitted with EOT cranes and Slipways are aided by gantry cranes.

High Speed Shipbuilding & Engineering Co Ltd (HSS&E).

HSS&E is a joint venture with Mitsui Engineering and Shipbuilding Industry of Japan. This shipyard constructed five deep-sea fishing trawlers for local owners and received orders from the FAO (Food and Agricultural Organization of UN) to build eight grain carriers. It built the first barge-mounted power plant for Rural Power Company Ltd (RPCL), several oil tankers, and a fast moving patrol boat for Navy and troops carrier for the Bangladesh Army.

Khan Brothers Shipbuilding Ltd. Khan Brothers Shipbuilding Ltd was established in 2007. The shipyard, in terms of capacity, is able to process 10,000 tons of steel annually. The shipyard can deliver four ships of 6,000 tons DWT. The yard has Design Office, Fabrication Sheds and Shipbuilding Sheds.

Table : Summary of New Ship Building Capacity of Bangladeshi Shipyards (as of 2016)

Name of Yard	DWT (ton)	LOA (m)	Breath (m)	Draught (m)
CDDL	20000	173.8	23	9.5
KSY	2000	100	15	4.5
DEW'N	1200	60		3.0
WMSL	10000	130	15	4.5
ANANDA	8000	130	15	3.5
COMILLA Ship Builders	1200	100	15	3.0

Source : Prepared by the Author

Bangladesh shipyards have the capability to build certain export quality ships with a varieties of multipurpose vessel, fast patrol boat, container vessel, cargo vessel, tanker, dredging barge, ro-ro ferry, passenger vessel, landing craft, tourist ship, tug, supply barge, deck loading barge, pleasure craft/yatch, crane boat, speed boat, deep sea trawler, self propelled barge, inspection vessel, cargo coaster, troops carrying vessel, double Decker passenger vessel, hydrographic survey boat, pilot boat, hospital ship, water taxi, pontoon etc. Bangladesh is suitable for small and medium ships up to 15000 DWT and some extend 25000 DWT (Quora, 2016).

Assessment on Copetitive Parameters

Competitive Parameters for Shipbuilding

Value Chain : Upstream and Downstream Linkages. In addition, this industry needs backward and forward linkage industries, steel and electricity businesses, social infrastructure and logistics, and financing support. No nation can sustain in a competitive field like shipbuilding without technological enhancements and innovation.

Marketing Strategy. Of the Asian nations, Korea, China and Japan hold a majority share in terms of order book. In terms of business strategy, Chinese shipbuilding business models fall on the cost leadership with less product differentiation. Compared to Japan, Korean ship builders have been emphasizing more product differentiation. As in mid 80's, Korea aimed to produce different types of ships. Korea has become a specialized and a global leader in VLCC, LNG and large container ships. Japanese ship builders have continued the strategy of producing low resolution and less value-added bulk carriers and middle-sized containers. Similar to Japan, China offers competitive price to the market. Compared to Korea, European shipbuilders who are known as major cruise ship providers, offer more sophisticated vessels with higher price than Korean shipbuilders. They focus on producing more luxurious vessels with one-off designs such as cruise- ships. Considering the market strategies Bangladesh can adopt the cost leadership with less product differentiation strategy utilizing the cheapest labour available.

Growth Trend. The global shipbuilding industry experienced a rapid decline from 2008-2009 in new shipbuilding orders in 2010 due to economic downturn. Currently, major shipping lines are experiencing profit decline and concentrating on smaller, profitable routes to minimize overhead cost. With growing environmental concern and tougher regulatory requirement to reduce pollution from old vessels, demand for new vessels are likely to rise in near future. Bangladesh can capture a major portion of market of small vessel segment.

Investment Trend. Due to capital intensive nature, shipbuilding has generally been the more attractive option for developed economies like Japan, Korea and China. However, emerging economies, which although not technically advanced could count on a significant supply of low cost labour. Countries can attract foreign investment and technology in joint venture as being done in India and Vietnam.

Competitive Risks. Shipbuilding industry has high entry barriers due to huge capital investments, acquisition of highly specialized equipment and requirement of high-skilled labor. The bargaining power of buyers in the industry is quite high. Buyers make decision on price, quality, and timely delivery where bargaining power of suppliers is low. Suppliers to the ship building industry are mostly steel manufacturers or parts manufacturers and these suppliers do not have high influence because of the switching cost. The rivalry among firms in the shipbuilding industry is quite intense and is mostly based on price competition.

Competitive Dynamics of Bangladesh

Manpower Factors. The presence of shipyards in particular for long time with large pool of workforce is the main strength of Bangladesh shipbuilding industry. Management professionals, electronic, electrical, information technology and communication engineers of the country are capable of serving in shipbuilding. The technical institutes with about 40000 intake capacity of producing skilled manpower with regard to shipbuilding industry is very useful to support this industry.

Wages. Wages have a major impact on competitiveness as wage accounts for large part of the costs of a ship. The labor share in total production cost strongly depends on wage levels and labor intensity of production process. In Europe and Japan this percentage is 21-23% and 19% in Korea. A shipbuilding labor cost in India is estimated at 8-10% of total costs (Proceedings of MARTEC, 2010). Competitive price advantage gained from plentiful cheap labor played significant role in lifecycle development of shipbuilding industry

and will be likely to continue in foreseeable future. Figure shows hourly labour charge for shipbuilding in Bangladesh and other countries. Comparison of labour cost and productivity with other competing nations depicts that Bangladesh scores in the top position.

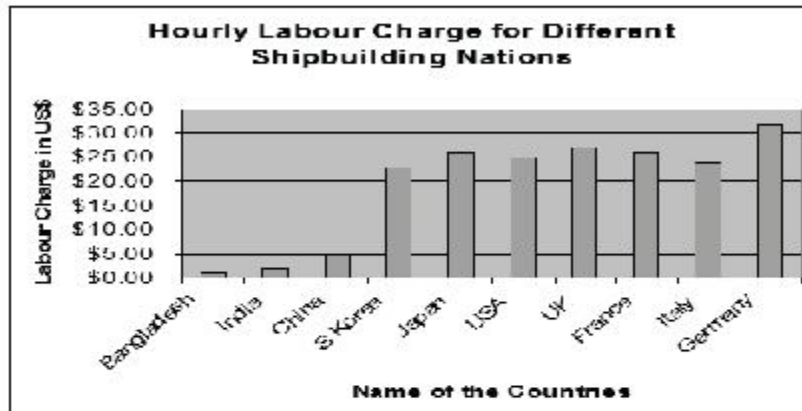


Figure 15 : Average Hourly Labour Charges (in USD) for Different Shipbuilding Nations around the World

Source : Proceedings of MARTEC 2010

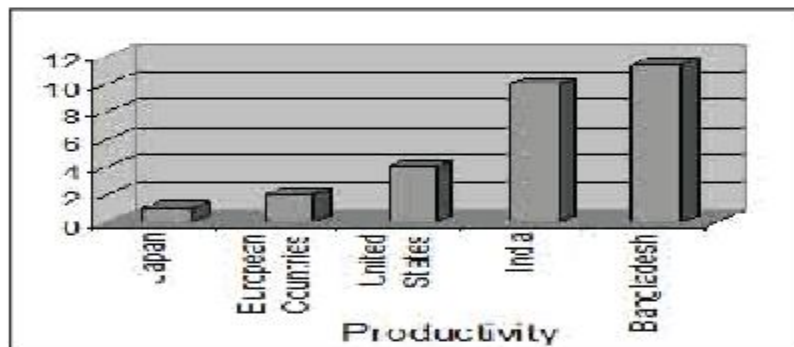


Figure : Shipbuilding productivity of different countries around the world

Source : Zakaria et al

Land Factor. Location of Bangladesh at the apex of the Bay of Bengal provides access to Global market, as major shipyards like Chittagong Dry-dock Ltd, Western Marine Shipyard Ltd, Karnaphully shipyard Ltd are situated beside Karnaphully river. Geographic and hydrographic features limit them to build ships with draft of 9.5 m and Length over all up to 195 m due to channel restriction.

Raw Materials. Steel as the main raw material determines price of vessel to large extent. For Bangladesh, entire amount of steel for class building has to be purchased from outside country although few local companies are producing limited class steel plates in the recent time.

Experience. Companies like WMSL and Ananda shipyard have experience of building class ships in Bangladesh. Khulna shipyard has also gained considerable experience in Building small Naval and inland vessels in recent years.

Technology and Knowledge : R&D and Innovation. South Korea has the highest R&D expenditures (240 million euro in 2006) which is almost 1% of production value. China takes the second place in absolute ranking (140 million euro). Japan is placed in the third (Proceedings of MARTEC, 2010). Shipbuilding industry in Bangladesh is still in rudimentary stage. Except WMSL, many yards are lacking in very basic facilities like Cavitation Tunnel, Structural laboratory etc. However, Bangladesh shipbuilding industry is one of few industrial sectors that have gained international reputation.

Capital Factor. Capital investment is major factor in Bangladesh due to high interest of loan as well as ability of the firms to pay back. Many of the shipyards faced difficulties to handle bank loans. Government control and patronization can enhance capital flow in shipping industry in addition to Foreign Direct Investment.

Commitment by the Government. To foster maritime economy government has formed Maritime Desk in Foreign Ministry as well as has intended to build ships in state owned shipyards like Chittagong Dry dock Ltd and KSY. Government agencies are buying ships from domestic yards and assisting in capacity building.

SWOT Analysis on Shipyard Industries in Bangladesh

STRENGTHS	WEAKNESSES
• Cheap, hardworking, less demanding and available workforce • Presence of various ancillary industries and technical institutes • Government's positive commitment • Duty free market, easy importation facility etc. • Suitable Geographic location	• Unavailability of Technology • Inadequate Power and infrastructure • Complicated Financial sector • Poor Productivity and management • Higher input cost and delivery time • Knowledge gap between institutions and industries • Dependency on import for raw materials • Weak Industrial culture
OPPORTUNITIES	THREATS
• To penetrate world shipbuilding industry for earning huge foreign currencies • Development of skilled manpower and more employment • Up-gradation of supporting industries • R&D, innovation and technological enhancement • Higher economic growth	• Financial climate (more difficult/costly to get financing) • Draining out of skilled labor force • Low National Brand Image • Regional Competition • Political Instability

Deduction. To compete in high value market Bangladesh needs to focus on the productivity issue which is low due to inefficient management and adequate infrastructure. Along with productivity, the industry is facing problem from working capital constraint. Low productivity persists because of poor technology in shipbuilding. However, there are huge potentials and opportunities for Bangladesh to step into this heavy industry to foster sustainable economic development based on the cheapest labour factor.

Conclusion

The highest repairing and new building capacity in Bangladesh is 20,000 DWT and 10, 0000 tons respectively which is far below the requirement. Main problems for capacity building are capital integration and technology. Ship building also needs skilled manpower where Bangladesh is lacking though it has abandon of unskilled labour.

The capacity of domestic shipyards is insufficient even to mitigate domestic demand. Global economic and shipping trends depict that Bangladesh has opportunities to capitalize demand of building small and medium ship for international market. The regional shipbuilding giant Japan and Korea is focusing for hi-tech and larger ship where India, China and Vietnam are building smaller ship. China and India are also likely to shift focus to larger shipbuilding. So, Bangladesh can capitalize market of building small and medium ships for global markets.

There are sufficient no of institutions to supply manpower which can be turned into skilled work force. Capital can be attained by foreign investment as well as investment by the private and public sources. Technology can also be acquired through Transfer of Technology and Indigenization. For Transfer of Technology (ToT) and Foreign Investment, it is important to ensure the return on investment. For this, policy incentives, government investment and procurement of ships from domestic shipyards will be essential.

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Biography of the Writer



Captain M Atiqur Rahman, (G), afwc, psc, BN is the first General Manager Administration of Chittagong Dry Dock after Bangladesh Navy takes over the yard. Prior assuming duties, he studied Masters in Business Administration and Masters in Defense Studies (MDS). He has also achieved M. Phil degree on Strategy and Development Studies. He has undergone courses on Defense Management conducted by DRMI, Monterey, USA, Comprehensive Crisis Management Course from Asia Pacific Centre for Strategic Studies (APCSS), Hawaii, USA and Regional Maritime Security Course from Indian Naval War College at Goa. He has also completed Command and Tactics Course from Dalian Naval Academy, China, Staff Course from Defense Services Command and Staff College (DSCSC), Mirpur and Naval Staff Course from US Naval War College, Rhode Island, USA. Recently, he has completed Armed Forces War Course from NDC, Mirpur.

Captain Atiq started career with the 'Best All-round Midshipman' and 'Best in Academy' award in BN and by now he is 28 years in service. Notably, he commanded five BN ships, served in Special Security Force, Bangladesh Naval Academy and School of Maritime Warfare and Tactics. He also served as Chief Staff Officer to Commodore Commanding Khulna. He served United Nations as Military Observer. During long service career the officer widely travelled in USA, China, India and West Africa. Some other travelled countries include Sri Lanka, Maldives, Qatar, UAE, Turkey, Thailand, Singapore, Malaysia etc.

The Captain has number of articles published in various international and national journals. Captain Atiq is a sportsman and loves playing golf and traveling. In personal life, Capt Atiq is happily married and blessed with a lovely daughter and a son.

MARITIME EDUCATION AND TRAINING VIS-À-VIS PRIVATE MARINE ACADEMIES OF BANGLADESH : A QUEST FOR GLOBAL QUALITY

Captain M Nazmul Hassan, (N), NPP, psc, BN

Abstract

No doubt that approving more private academies for producing seafaring officers against the global demand was a praiseworthy decision by the Department of Shipping (DoS). But then, the question arises on the quality of Maritime Education and Training (MET) imparted by these newly approved private marine academies since International Maritime Organization (IMO) remains as the watchdog for the safety of global shipping on behalf of 170 member states. Bangladesh being one of the White Listed countries at IMO earned good reputation for her MET graduated seafaring officers. DoS, the lone maritime administration in Bangladesh, is responsible for supervision, monitoring, auditing and evaluating the quality of MET imparted by the marine academies. DoS approved 20 private marine academies to impart MET since 2001. There are controversies on the quality standards of MET imparted by some of these Bangladeshi Private Marine Academies (BPMA). So, the explorative study was undertaken by the researcher to examine the quality standards of MET provided by BPMA. After reviewing literatures and conducting pilot interviews with MET veterans, the researcher hypothesized a general and positive assumption with its Null and Alternative versions. Then, the study explored the yardstick to measure the quality standards of MET globally and examines the present quality standards of MET imparted by the newly approved private marine academies of Bangladesh. Finally, the study recommends necessary measures to be undertaken by the stakeholders so as to ensure global quality of MET in Bangladesh.

Keywords : Private Marine Academy, MET, Global Quality, IMO, White List, DoS, Seafarers, STCW 2010 amendments.

Introduction

Bangladesh is a seafaring nation since the ancient era. Seafarers are the heart as well as the prime mover in the maritime transportation industries. The growing shortage of seafaring officers fuelled by the rapid growth of global fleet opened up opportunities to tap potential for populous and unemployment abundance countries like Bangladesh (Hassan, 2018). Well trained seafaring officer means safe navigation, efficient operations, good maintenance of ships and no accidents. More than 80% of all accidents at sea are caused by human error (Ziarati, 2007). Training decisions of the marine academies directly affect the safe and efficient manning of the ship that ensures less accidents at sea. The formal introduction of MET in Bangladesh can be traced back to early sixties through the lone government owned marine academy of Chittagong. According to Drewry manning report of June 2015, shipping will require an additional 42,500 officers by 2019. While BIMCO/ICS manpower report of the same year forecasts shortage of 1, 47,000 seafaring officers by 2025, Bangladesh, on the other hand, is capable to produce enough seafaring officers for the global fleet despite meeting her domestic demand (Hassan, 2018). The global demand for seafaring officer is increasing with the growing growth of maritime trade and commerce. To meet the demand for the vibrant shipping industries, numbers of private marine academies were set up by Bangladeshi entrepreneurs since 2001. The Department of Shipping (DoS), the lone regulatory body in Bangladesh, is responsible to IMO for ensuring the maintenances of the standards as laid down in the Standards of Training, Certification and Watch Keeping (STCW) for Seafarers conventions. The present examination and assessment systems laid in STCW 2010 amendments guide the maritime administration of every member state in ensuring the quality standards of MET for seafaring officers since it is a global profession. Though not sufficiently stuffed, DoS approved 20 private marine academies to impart MET since 2001. Many of those are not yet well equipped with infrastructure, quality instructors and equipments for imparting MET conforming to STCW 2010 amendments. Any degradation in maintaining MET quality by these private marine academies will affect Bangladesh in losing her White Listing credentials at the IMO. So, the researcher explored the answers

as to what would be the yardstick to measure the quality standards of MET globally and the present quality standards of MET imparted by the BPMA through different tools and techniques of data collection. A Sample Survey on BPMA was conducted besides interviewing many MET experts including former top brasses and the top most policy makers of shipping. A perception survey followed by Focused Group Discussions (FGDs) also helped the researcher to collect required data for thematic and quantitative analyses. Barnett's Education Quality Care Model was also used in the study for the purpose of analysis. The research hypotheses have also been tested and validated. Finally, the researcher recommended pertinent imperatives for Bangladeshi stakeholders for ensuring the global quality standards of MET as required by STCW 2010 amendments.

Literature Review

Alamgir (2017) stated that MET may be defined as the process of knowing maritime affairs from the sea job to shore shipping management, way forward to the legal, logistic, transport and Supply Chain Management. Ziarati (2007) argued that according to IMO 80% of accidents at sea are caused by human error. The IMO accident analysis reports clearly indicate the causes of many of the accidents at sea are due to deficiencies in education and training of seafarers. Sampson (2004) believed that 'when MET are benchmarked with other disciplines, the additional expenses on MET such as equipment (simulators), devices, laboratories, special accommodation requirements should be considered. Stopford (2009) argued that the aim of this STCW 1978 conventions were to introduce internationally acceptable minimum standards for the training and certification of officers and crew members. Compton and Fink (2010) stated that the STCW 1978 conventions had many limitations. The conventions were significantly amended in 1995 to deal with its shortcomings. The latest regulatory changes from IMO are Manila Amendments 2010. Kabir (2014) argued that MET institutions in Bangladesh are generally not in full and complete compliance of quality standards system. Hassan (2013) argued that DoS should be strengthened with both qualified manpower and infrastructure for monitoring the quality standards of MET imparted by both public and private marine academies. Barnett (1992), one of the contemporary thinkers of higher

education and total quality management (TQM), says “Quality in higher education demands the establishment of an institutional culture, not so much a matter of TQM but rather one of Total Quality Care, in which each professional is seized of his or her responsibilities and takes care over all his or her own professional efforts”. Fadely and Santos (2010) argued that STCW provides defined requirements for certification of key competencies for seafarers. Internationally recognized quality management framework such as ISO 9001 can provide a maritime training center with a clear path for curriculum development including wider acceptance and approval of its courses from international flag-state administrations. By merging the two standards together, training centers are better able to produce curricula which will meet the regulatory requirements, achieve and maintain flag-state approval, and secure the best competitive advantage. Web (1966), Campbell (1966), Denzin (1978) and, Smith and Kleine (1986) have argued that 'triangulation' is actually used to increase accuracy and validity of the study.

The Conceptual Framework

The researcher also perceived that quality level barrier in different certification paths of MET plays a very vital role in ensuring global quality of MET imparted by marine academies/institutes. As such, the overall concept on the quality of MET used in the study is shown in the Figure below :

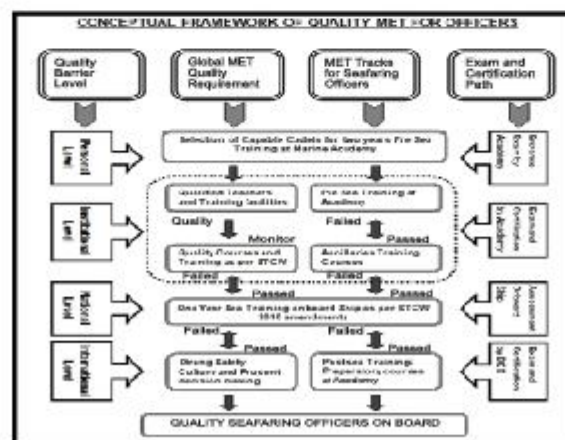


Figure-1 : The Conceptual Framework for the Quality MET

Research Hypothesis

Formulating hypothesis of such explorative study on intangible and complex issue like MET quality was quite challenging. After reviewing literatures and conducting pilot interviews with MET veterans, the researcher hypothesized a general and positive assumption with its Null and Alternative versions below :

H₁ : All the Bangladeshi Private Marine Academies are imparting global quality standards of MET as required by STCW 2010 amendments of IMO.

H₀ : All the Bangladeshi Private Marine Academies are not imparting global quality standards of MET as required by STCW 2010 amendments of IMO.

H_A : Some of the Bangladeshi Private Marine Academies are imparting global quality standards of MET as required by STCW 2010 amendments of IMO.

Methodology

Pilot interviews with the MET veterans and key stakeholders gave the researcher insights to formulate hypothesis and guidance for conducting further in-depth interviews and FGDs with other MET stakeholders. It also helped the researcher to prepare the semi-structured questionnaires for the sample survey, interviews and the perception survey. He then conducted a small scale perception survey to validate hypothesis on the quality standards of MET imparted by BPMA. Data were collected and analyzed using both the quantitative and qualitative tools including Barnett's Education Quality care model. To ensure better accuracy in findings and stronger validation of the hypothesis triangulation methods were used in the maiden study on MET quality of the BPMA. Finally, a few measures have been recommended to upkeep the MET quality standards of BPMA.

Sample Survey : Rational and Sampling Details

A sample survey through a semi-structured questionnaire was conducted among 15 private marine academies out of a survey sample population of 20. The sample selection was purposive and judgmental. Out of the samples only 02 private marine academies are located in Chittagong while the rest 14 including two UK-Bangladesh joint ventured private marine academies are located at Dhaka. As such, 03 purposive Sample Frames (SF) were constructed depending on their specialty in business nature and location.

FGD and Interview : Rational and Sampling Details

A total 03 groups of deck cadets and 02 groups of engine cadets totaling 60 cadets took part in the FGDs at their respective academies in different time. The researcher could not conduct FGD in Chittagong area because of scarcity of time and opportunities. A total of 09 MET experts/policy makers were interviewed in-depth, face to face and with interview guide by the researcher. Besides, 06 MET examiners/Commandants were also distributed self administered questionnaire through e-mail and hand delivery as convenient. All the samplings were purposive and judgmental in nature.

Perception Survey : Rational and Sampling Details

Where the evidence base is weak, perception surveys can be useful to test policy assumptions (Muggah, 2012). Determination of the target population of perception survey was a huge challenge for the researcher as there were no comprehensive reliable data on the stakeholders of MET. However, it was presumed that the sample population during the study would be some 2,500. So, for better result, the minimum sample size for the perception survey was calculated to be 246.

As such, the researcher distributed approximately 760 questionnaires through e-mail and hand delivery so as to receive at least 246 responses for a credible perception of MET Stakeholders. But only 260 respondents returned filled up questionnaire. Out of which 257 were accepted for analysis as they were

unambiguous and complete with required data. Out of the samples, 45% were MET cadets ageing between 18 and 25 years while other 45% were MET graduated seafaring officers with age range between 25 and 55 years. The rest 10% samples were MET veterans, DoS officials and policy makers.

Ethical Considerations

To adhere with research ethics, the researcher used code names (J1, C2, D3, etc) to the sampled marine academies for maintaining their business interest, privacy and confidentiality. Language has always been classed as a sensitive issue in both qualitative and quantitative research. As such, the researcher gave due considerations on Language issues and conducted most of the interviews and FGDs in Bengali for better understanding. The research report focused on the finding of sample survey of BPMA, perception survey and other qualitative and quantitative data collection tools. However, the researcher did not consider findings of FGDs in the thematic analysis fearing being biased.

STCW Conventions, White Listing Credentials and the IMO Regime

The IMO is responsible for vetting the training, examination and certification procedures of MET as per STCW conventions to ensure for global safety of shipping. Maritime Safety Committee (MSC) of IMO set minimum quality standards in 1978 through STCW conventions and codes that are applicable to all the seafarers of the world. The presently in vogue STCW 2010 Manila amendments were intended to include all agreed changes since 1995 in regards to changed technologies, inconsistencies, interpretations and outdated provisions. It came into force on the 1st January 2012 and continued to emphasize quality standards of MET and competence rather than sea service or period of training.

Maritime administration of member states have to provide MET information to MSC for consideration and judgment as to whether or not the concerned state meets the requirement of the conventions as amended time to time. The result of these judgments is published as a list of confirmed parties to STCW is named as 'The White List'. The list will be kept under continuous review and may be changed depending on the member state's performance. The

certificates issued by a white listed country is ideally accepted by other member states in principal. Seafaring officers around the globe need to maintain high standards of competence and professionalism while serving on board ships. Seafarers holding certificates or endorsements issued by white listed countries should find it easier for them to get jobs on board ship of global fleet. So, Bangladesh needs to ensure quality standards of MET so as to remain white listed at IMO. In the perception survey, most (96%) of the respondents agreed that Bangladesh may have lost her white listing credentials if the quality standards of MET imparted by marine academies are not ensured as required by STCW 2010 amendments (Figure-2).

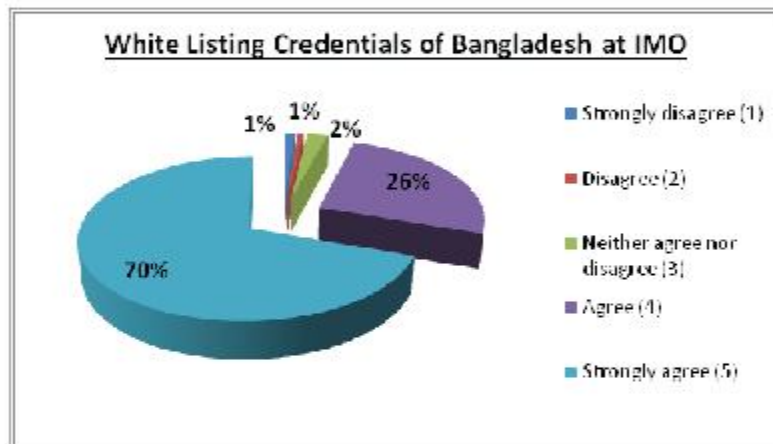


Figure-2 : Responses on MET quality and White Listing Credential

MET Quality, Training Audit and the BPMA : An Overview

Each education and training institution needs to have its academic and training program and courses duly approved by the maritime administration prior conducting courses and issuing certificates in that effect. It is the duty of every member states to ensure the MET quality, their assessment and certification of seafarers are being conducted according to section A-I/6 of STCW 2010 amendments. Regulation I/6 of STCW states “Each party shall ensure that all training courses and institutes shall be supervised, assessed, approved and monitored by the Administration.” Documentary evidence of such check, assessment, approval and subsequent monitoring must be available both with the

institutes as well as the DoS. According to the regulation, 1/8 of STCW a quality standard system has to be maintained and audited once in every 5 years for seafarers' certification. The audit team normally visits training institutes to inspect the syllabi and procedure for oral and any other test and examination conducted by the academy/ institutes. The overall MET quality standards can be achieved through just policy, monitoring, quality management including documented procedures, recordkeeping and periodical evaluation for further improvement. However, 55% respondents of the perception survey do not think that the training quality of BPMA are regularly supervised, monitored, audited and evaluated by DOS conforming to the requirement of STCW 2010 (Figure-3).

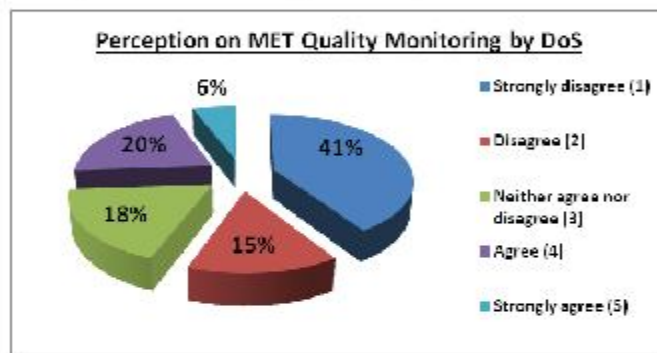


Figure-3 : Responses on MET Quality Monitoring by DoS

Bangladesh has been privileged of being elected to and serving the Council of the IMO as one of the ten proud members in the category-'B'. So far, she has signed mutual and unilateral agreement with 19 member states in regards to seafaring potential for recognizing issued MET certificates reciprocally and unilaterally. Beside, DoS has accessed, accredited, ratified and complied more than 30 international conventions including SOLAS, MARPOL, Load line and STCW by far. Documentary evidence at DoS shows that the first 3 private marine academies were approved by DoS in 2001. Then, the rest of the BPMA were approved during 2011 and 2012 except one each in 2008, 2009 and 2010. According to DoS, 667 deck and 829 engine cadets have passed pre-sea training as of April 2017 from 14 private marine academies/institutes that were in operation. Out of them only 902 cadets could join on board ships and rest 594 are awaiting for sea training.

Thematic Analysis : Findings and Observations

Summary of FGD on MET Quality

A total 60 cadets from 03 different samples took part in the FGDs at their respective academies in different time. The FGD progressed in close door with the FGD Guide and none but the students and the researcher were present. All of them were satisfied with the attributes like quality of instructors, courses and infrastructure. However, most of them do not have their own simulator/workshops facilities and ISO certification on the MET quality of their respective academies. Again, only the competent private marine academies allowed the researcher to conduct FGDs. So, the FGDs findings seemed to be biased and, therefore, were not considered further by the researcher.

Barnett's Education Quality Care Model Analysis

According to Barnett (1992), one of the contemporary thinkers of higher education and TQM, quality in higher education institutions can be seen both in qualitative and quantitative terms. He suggested that there are four core activities that take care of quality in higher education. These form a 'Protective belt' to the overall student development and experience that is central to quality higher education. Within the framework below at Figure-4, these ideas of Barnett are depicted.

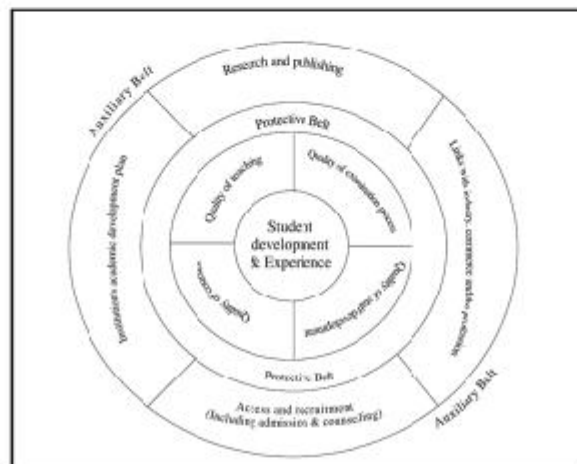


Figure-4 : Barnett's Higher Education Quality Framework (Source : Internet)

The quality status of MET imparted by the BPMA can also be analyzed using the 4 items of the 'Protective Belt' below (Table-1) :

Protective Belt Items	MET Quality Status Analysis	Remarks
a. Teaching and learning	Shortage of STCW qualified instructors and training infrastructure at many of the BPMA.	Partially Lacks in Quality
b. Student assessment	No Central assessment system for the BPMA during or after 2 years of pre sea training.	Lacks in Quality
c. Staff development	Adjunct faculty hampers staff development at the BPMA.	Partially Lacks in Quality
d. Curriculum / courses	No DoS approved common curriculum for the pre sea MET training of the BPMA.	Lacks in Quality

Table-1 : Barnett's Quality Care Analysis: Protective Belt

The 'auxiliary belt' exists beyond the protective belt. The quality status of MET imparted by the BPMA can also be analyzed using the 4 important items of the 'Auxiliary Belt' below to maintain quality education (Table-2) :

Auxiliary Belt Items	MET Quality Status Analysis	Remarks
a. Admission and Recruitment	Admission and recruitment at BPMA is not very competitive.	Lacks in Quality intake
b. Industrial Attachment	No sea training on board ship during pre sea training of BPMA.	Lacks in Quality MET training
c. Institutional Development plan	Most of the BPMA got their vision and development plan	Quality Compliant
d. Research and publication	No research and Publication by any of the BPMA	Lacks in Quality

Table-2 : Barnett's Quality Care Analysis : Auxiliary Belt

So, from the analysis above on the items of both the Protective belt and the Auxiliary belt, it can be deduced that the most of the BPMA needs to develop their capacity to adhere with the items mentioned in the Barnett's Higher Education Quality Care Model.

Summary of the MET Experts' Interviews

Every respondent agreed that STCW conventions and Codes as amended time to time is the minimum requirement for quality MET and may be treated as

the yardstick of quality MET globally. All the MET veterans interviewed unanimously agreed that the capacity of DoS should be strengthened and reformed through a comprehensive MET policy, required qualified staffs and infrastructure for upholding white listing credentials of Bangladesh. Many of the veterans agreed that a separate and dedicated MET Examination Cell like India with sufficient qualified staffs could be set under DoS so that strict MET quality may be ensured. Some of them opined that all the marine academies/institutes may be brought under the Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) for ensuring global quality of MET standards. However, the top shipping policy maker thinks that branding Bangladeshi MET through strict compliance of STCW 2010 amendments is rewarding in the long run rather achieving ISO certificate from a few global classification societies.

Quantitative Analysis : Findings and Observations

MET Quality Analysis Based on Questionnaire Survey

The response rate of joint ventured marine academies (SF-1) was 100% while the other groups (SF-2A & 2B) of questionnaire survey were 35%. Taken all together, only 6 out of 15 samples, albeit 40% returned the questionnaires. Other 02 private marine academies though not returned questionnaire but regretted through e-mail. However, the sample frame, size, location and response status are shown below :

Sample Frame(SF) / (Population)	Specialty / Business Nature	Sample Size	Sample Location	Response Status
SF-1 (02)	Joint Ventured 02 yrs HND training program with 01 yr in U.K.	02(J1,J2)	Dhaka	All returned Questionnaire
SF-2A (12)	DoS approved 02 yrs pre sea training program	04(D1,D2,D3,D4)	Dhaka	All but D2 returned Questionnaire
SF-2B (06)	DoS approved 02 yrs pre sea training program.	02(C1,C2)	Chittagong	All but C1 returned Questionnaire

Table-3 : Sample Frame, Size, Location and Response Status

Five key attributes affecting the quality standards of MET imparted by the private marine academies were considered while analyzing SF-1. Then, putting an average weightage of 20 for each of the 5 attributes that affect directly the quality standards of MET and considering 60 is the minimum pass marks, the overall quantified result of MET quality of J1 and J2 are found 60 and 80 respectively. However, the quality matrix for SF-1 below (Table-4) shows that both samples of SF-1 are imparting quality MET.

Attributes	Sample Academy	
	J1	J2
Standard Instructor-Student Ratio	Yes(1:7)	Yes(1:8)
Training Facilities	Yes	Yes
Standard Infrastructure	Not Standard(Limited)	Not Standard(Limited)
Simulator/ Workshops	Yes(Resource shared with other private academy)	Yes (Resource shared with partner college at U.K.)
ISO Certification	No (But the partner college in U.K. possesses)	Yes (ISO 9000:2008 from RINA)
Quality Test	Passed	Passed

Table- 4 : Data Analysis for MET Quality (SF-1)

Following the same methodology including weighted matrix for the attributes, the quality standards of MET imparted by the 04 samples of SF-2A are analyzed and the test result shows below (Table-5) :

Attributes	Sample Academy			
	D1	D2	D3	D4
Standard Instructor-Student Ratio	Yes (1:10)	Regretted after receiving Questionnaire	No (1:22)	Yes (1:10)
Training Facilities	Yes		Yes	Yes
Standard Infrastructure	Yes		No (Limited)	Yes
Simulator/ Workshops	Yes (Resource shared)		Yes (Resource shared)	Yes
ISO Certification	Yes (ISO 9001:2008 from GL)		No (Under process)	Yes (ISO 9000:2008 from RINA)
Quality Test	Passed	Withheld	Failed	Passed

Table-5 : Data for Quality Quest (Sample Frame-2A)

It is to be mentioned that the result of sample D3 was considered withheld as the sample regretted sending the mail below :

“Got your mail. Reply to some of your question is not viable on promotional/business point of view. Please check our website for some information. If not sufficient then please visit us at your convenience. Best regards.”

In case of SF-2B, sample C1 regretted as they had to close their cadet training program because of difficulties faced while placing passed out cadets of first batch in Singapore for sea training as per agreement with a partner institute. However, following the same methodology, the table below (Table-6) analyzes the quality standards of MET imparted by the samples of the SF-2B :

Attributes	Sample Academy	
	C1	C2
Standard Instructor-Student Ratio	Regretted as they stopped operation	Yes(1:14)
Training Facilities		Yes
Standard Infrastructure		Not Standard(Limited)
Simulator/ Workshops		Yes (Resource shared)
ISO Certification		No (Under process)
Quality Test	Withheld	Passed

Table-6 : Data for Quality Quest (SF-2B)

Taken altogether, 05 out of 08 samples though passed the test (Figure-5), but the researcher, after visiting few of those, feels that the real situation may be even worse. So, to assess the real state of quality of all the approved BPMA, DoS need to undertake a special and exhaustive evaluation immediately.

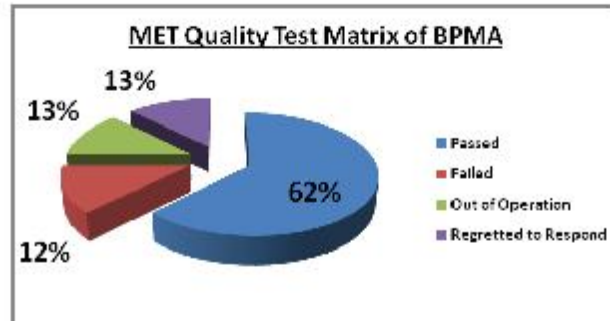


Figure-5 : MET Quality Test Matrix - The BPMA

MET Quality Analysis Based on Perception Survey

More than 73% respondents think that all the BPMA do not have their own training infrastructure including swimming pool. Many of the BPMA do not have required number and types of simulator and laboratory facilities for both Nautical and engineering department as required by the STCW 2010 amendments (Figure-6) :

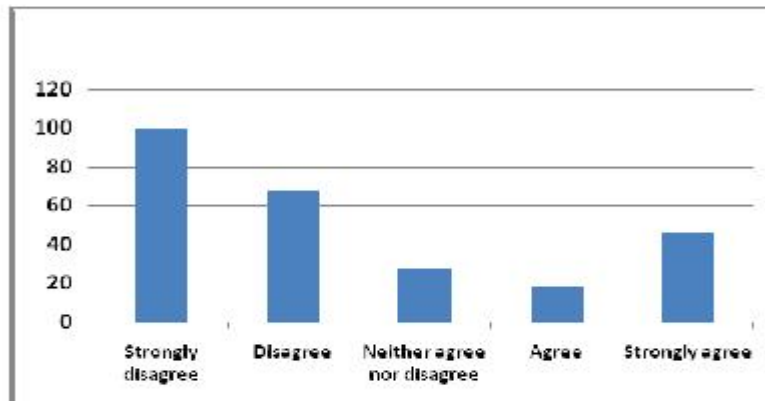


Figure-6 : Responses on Simulator and Lab Facilities of BPMA

More than 66% respondents think that all the BPMA do not have required number of STCW 2010 qualified Instructors in their respective departments (Nautical/ Engineering) of MET (Figure-7) :

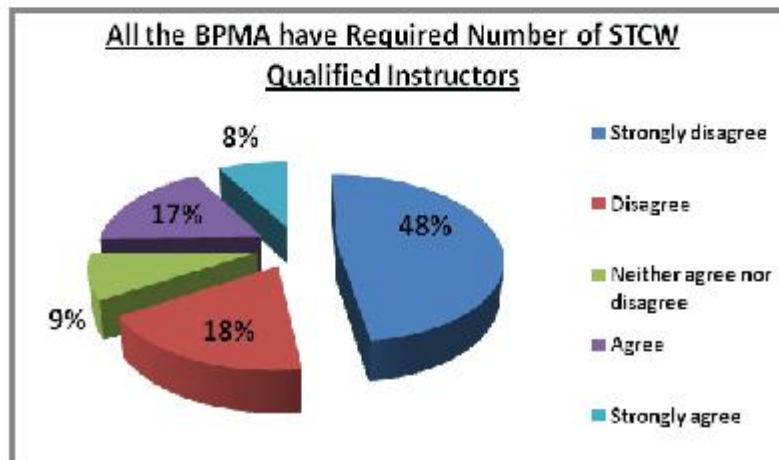


Figure-7 : Responses on STCW Qualified Instructors

All the respondents unanimously agreed that DoS needs to build its capacity for monitoring the quality standards of MET imparted by both public and private marine academies of Bangladesh. However, 88% respondent think that lack of required qualified manpower for supervision, monitor, audit and evaluation is one of the major challenges for DoS to ensure the global quality MET (Figure-8).

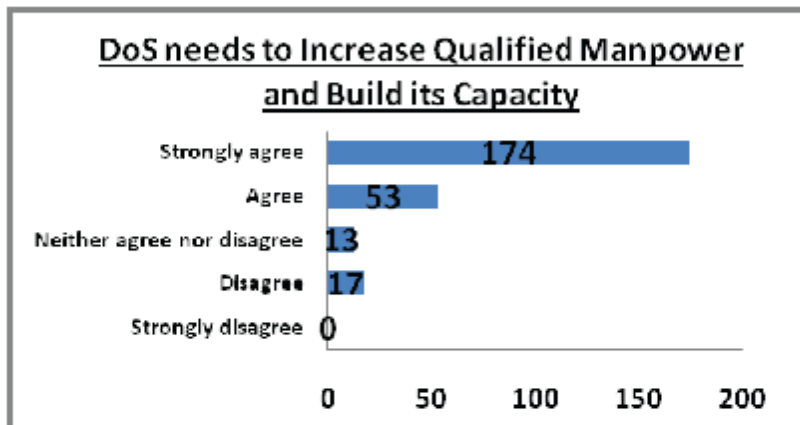


Figure-8 : Responses on Capacity Building by DoS

Only 11 respondents remain undecided and the rest (96%) unanimously agreed that DoS should promulgate a comprehensive MET policy and MET syllabus for different MET courses conforming STCW 2010 amendments. Again all (99%) but 03 respondents unanimously agreed that DoS should ensure that on line certificate verification system remains operational to avoid fraudulent certification in the name of Bangladeshi Administration. More than 88% respondents are in favor of a separate and dedicated MET Exam Cell with sufficient qualified staffs for ensuring strict MET quality. Besides, all but a lone respondent think that all the marine academies should be regulated and administered under the newly Maritime university for better ensuring the quality standards of MET.

Hypothesis Test

It was hypothesized that all the Bangladeshi Private Marine Academies are imparting global quality standards of MET as required by STCW 2010

amendments of IMO. All the qualitative data of the semi-structured questionnaire was converted into quantitative terms using the Likert response scale to test the hypothesis. There were 7 statements attributed in the questionnaire of perception survey. So, the highest possible score could be 35 (7 X 5) with its half value i.e. 17.50 as the parameter (Figure-9). The weighted average mean score of the attributed 7 statements under H₁ was found 17.10 that is less than the set parameter.

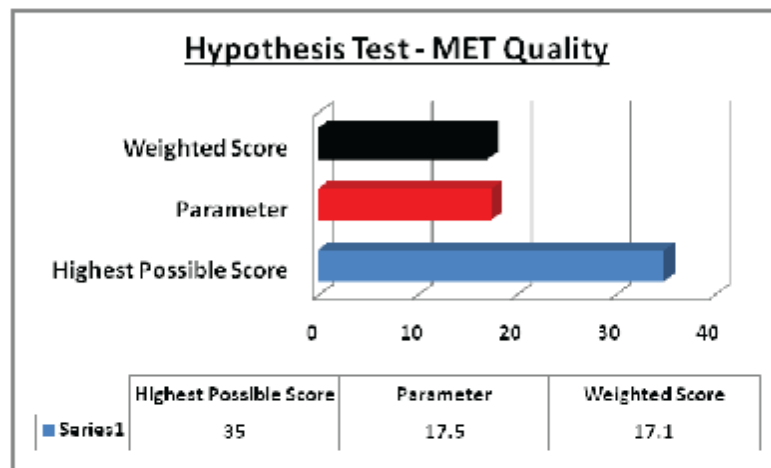


Figure-9 : Result of Hypothesis test

Thus, the hypothesis (H₁) is rejected. Therefore, the Null hypothesis is to be accepted. Again, the Null hypothesis may further be refined from the MET Stakeholders' perception on a very pertinent statement on ISO certification by some of the private marine academies. Besides, findings from other tools and the result of questionnaire survey also validate the alternative hypothesis. So, the alternative hypothesis of the study i. e. 'Some of the Bangladeshi Private Marine Academies are imparting global quality standards of MET as required by STCW 2010 amendments of IMO' is therefore accepted.

Measures Toward Global Quality MET

Based on the findings and observation of the conducted sample survey, perception survey, in-depth interviews, self administered questionnaires, FGDs, etc of the study, the researcher suggested following possible measures to ensure

global quality standards of MET imparted by the Bangladeshi private marine academies :

- a.** A special training audit and a rigorous evaluation besides the routine system may be undertaken by MoS/DoS immediately to examine the present status of all the approved private marine academies of Bangladesh. DoS may also ensure that all the marine academies/institutes must conform to the STCW 2010 amendments to uphold white listing credentials of Bangladesh at IMO.
- b.** All the private marine academies of Bangladesh may build their training and management capacities by ensuring required number of qualified instructors, quality management system, infrastructure facilities including simulators, workshops or practical lab for conforming to the requirements of STCW 2010 amendments. They may also maintain their own MET quality management system including a regular monitoring and auditing provision. For the global branding of their MET program, the BPMA may pursue to achieve ISO certificates on MET quality from the widely accepted international classification societies. Besides, they may also try to venture with world reputed shipping or manning companies while conducting global quality MET.
- c.** DoS should promulgate comprehensive MET policies and set up a dedicated MET Cell under its office. All the academies/ institutes imparting MET may be regulated, monitored and administered under the proposed MET Cell at DoS or BSMRMU for maintaining global quality of MET. The final examination of pre sea cadet training of all marine academies may be conducted centrally under BSMRMU like any other public examination to ensure common and global quality standards of MET.
- d.** The overall capacity of DoS including sufficient qualified manpower and infrastructure facilities needs to be built for regular and effective supervision, monitoring, auditing and evaluating the quality standards of MET imparted by marine academies of Bangladesh. DoS may also ensure

e-governance system including on-line certificate verification provisions to avoid fraudulent certification in the name of Bangladeshi Administration.

Recapitulation

Bangladesh had been conducting MET since 1962 through the government owned lone marine academy at Chittagong. She has the capacity to meet her domestic demand of seafaring officers besides being capable of supplying surplus seafaring officers against the global demand. It is presumed that about 6000 Bangladeshi officers and 3500 ratings are employed on board ships of the global fleet at present (Hassan, 2018). Considering the growing global demand for seafaring officers, DoS approved 20 private marine academies/institutes for conducting MET. Most of the private academies/institute are new and not quite so well known in the shipping market. Some of them need to improve required training environment including infrastructure, training facilities, quality instructors and management system as required by STCW 2010 amendments. However, it is encouraging that some of the private marine academies already achieved ISO certificates from accredited international classification societies. Besides, DoS needs to build own capacity for regular supervision, monitoring, auditing and evaluating the quality standards of MET imparted by all the marine academies of Bangladesh. The hypothesis of the study was empirically tested and the alternative hypothesis of the study was accepted. The overall observations and findings using triangulation method too validated the alternative hypothesis of the study and gave more credibility to put forward sound recommendations for Bangladeshi stakeholders of MET to ensure global quality standards of MET.

The research area itself is not much focused around the world let alone in Bangladesh. Being the pioneer, the researcher had lot of challenges in regards to the data of such unexplored area from the concerned authorities. Besides, no secondary data, publications or literatures in regards to the MET imparted by the BPMA could be found. Many MET stakeholders were contacted for in-depth interviews by the researcher but only few responded positively. Besides, the researcher found mixed responses while the respondents were asked about the

seafaring by Bangladeshi female officers. However, the lone public marine academy started recruiting a few female cadets by far. Interestingly, no female cadet was found in the private marine academies. As such, a comprehensive study may be undertaken in future to examine the challenges and opportunities of the Bangladeshi female seafaring officers who all are pursuing MET as the pioneer.

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Biography of the Writer



Captain M Nazmul Hassan, (N), NPP, psc, BN joined Bangladesh Naval Academy and was commissioned in the Executive Branch of Bangladesh Navy in 1995. He served on board various BN ships ranging from patrol craft to Missile Frigate in the capacity of the Executive Officer. He also commanded Patrol Craft, Mine Sweeper, Off-shore Patrol Vessel of BN and, at present, he is commanding CGS Tajuddin. He served Special Security Force (SSF) as Deputy Director (Protection). He also served Naval Headquarters as Section Commander to the Drafting Authority. He did many professional courses both at home and abroad. He is both Navigation and NBCD specialist officer. He earned his Masters of Public Affairs (MPA) degree from the University of Dhaka and a Post Graduate Diploma in Human Resource Management from BIMS. He also earned M Sc degree in Military Studies under Bangladesh University of Professionals, Dhaka. He has been married to Dr Sonia and blessed with three daughters.

ANTI-ACCESS/AREA DENIAL STRATEGY : BANGLADESH PERSPECTIVE

Commander M Shamsul Haque, (G), OSP, afwc, psc, BN

“The success of any major operation or campaign depends on the free movement of one’s forces in the theater. Without the ability to conduct large-scale movements on land, at sea, and in the air, operational warfare is essentially an empty concept.”

-Dr. Milan Vego¹

Introduction

Freedom to move around the battlefield is considered as a key requirement for success by a force in any major operation. Military commanders have also attempted to maneuver their forces to gain positional advantage over their enemies. Ability to move within the theatre and effective maneuver keep the enemy off balance and protect the force. They are used to exploit successes, to preserve freedom of action, and to reduce vulnerability. It continually poses new problems for the enemy by rendering his actions ineffective, eventually leading to defeat. As such, adversaries have regularly attempted to deny one another freedom of movement and maneuverability on the battlefield. Past forms of anti-movement efforts included barriers such as the Great Wall of China and the Maginot Line² etc. But, Anti-Access/Area Denial has emerged as a newer concept that essentially attempts to deny enemy freedom of movement. It combines the denial efforts on information, space, sea, and air.³ This term is coined by USA and generally aims to describe Chinese efforts to deny US access to Chinese waters.

In recent years, a major focus of China’s military has been the development of an operational concept to deny or make costly access to areas of the Western Pacific for potential adversaries. This concept is commonly referred to in the United States defense planning community as anti-access/area denial

1. <https://thestrategybridge.org/the-bridge/2016/8/25/defeating-anti-access-area-denial>.

2. Major Christopher J. McCarthy, loc cit.

3. Ben Wermeling, Defeating Anti-Access/Area Denial in the West Pacific, 25 August 2016; retrieved from <https://thestrategybridge.org/the-bridge/2016/8/25/defeating-anti-access-area-denial> on 05 June 2017.

(A2/AD).⁴ Modern A2/AD, however, has changed the character of modern warfare. Today, even major military power like USA acknowledges that A2/AD strategy is capable of posing significant challenges to their freedom of action. Hence, our military leadership must acknowledge A2/AD as a new way of war, comprehend the associated operational implications, and think of implementing such strategy in our operational environment in order to ensure defence of the country in a restricted geographic environment, such as, ours.

This paper aims to describe A2/AD strategy in general and then analyse the probability of implementing such strategy in our operational environment. Finally, it will highlight the required elements associated with implementation of this strategy.

A2/AD Concept

In 2003, the Center for Strategic and Budgetary Assessments (CSBA) defined anti-access as enemy actions which inhibit military movement into a theater of operations, and area-denial operations as activities that seek to deny freedom of action within areas under the enemy's control.⁵ A2/AD not only increases the dangers of conventional war, but also offers non-state actors worldwide options to increase the effectiveness of irregular or hybrid warfare.

a. Historical Perspective.⁶ Such strategy is not a new concept in military history. Countries adopted anti-access and area denial measures in some forms or others in different ages. The idea was basically to inhibit cavalry and infantry movement.

Anti-cavalry. In medieval warfare, sharp and sturdy stakes were buried at the bottom of long lines of ditches, pointed end up diagonally, in order to prevent cavalry charges in a given area. Even if the stakes were spotted, soldiers would be forced to dismount and effectively give up their advantage as cavalry as well as becoming easier targets. A more modern version, allowing

4. <https://thestrategybridge.org/the-bridge/2016/8/25/defeating-anti-access-area-denial>.

5. Major Christopher J. McCarthy, loc cit.

6. https://en.wikipedia.org/wiki/Area_denial_weapon.

quicker dispersal and providing the advantage of being hidden more easily, are caltrops, though items bearing close similarity (small balls with spikes) had been in use for most of antiquity. Many variants were also used, such as, boards with metal hooks, as described during battles of Julius Caesar. Passive fortification “ditches and obstacles such as dragon's teeth and Czech hedgehogs” were used as anti-tank (the modern “cavalry”) measures during World War II.

Anti-infantry. Simple rows or clusters of sharpened sticks (nowadays also known as punji sticks) and the use of small caltrops have been a feature of anti-infantry warfare for a long time. However, due to the difficulty of mass-producing them in the pre-modern age, they were rarely used except in the defense of limited areas or chokepoints, especially during sieges, where they were used to help seal breaches. Increasing ease of production still did not prevent these methods from slowly falling out of favor from the late Middle Ages onward. Caltrops are still sometimes used in modern conflicts, such as, during the Korean War, where Chinese troops, often wearing only light shoes, were particularly vulnerable. In modern times, special caltrops are also sometimes used against wheeled vehicles with pneumatic tires.

b. Elements.⁷ The strategy emphasizes the use of long range striking power aided by sensors, largely in the form of ballistic and cruise missiles, to hit naval surface forces and fixed targets on land. Surface-to-air-missiles and fighter planes guard these weapons from enemy air strikes while stealthy diesel submarines and missile-equipped surface ships pose an additional threat to naval forces operating in the area. The A2/AD concept also envisions strikes on enemy space-based sensors and communications. This system is designed to destroy or prevent enemy forces entering a given sea or air space.

7. Ben Wermeling, Defeating Anti-Access/Area Denial in the West Pacific, 25 August 2016; retrieved from <https://thestategybridge.org/the-bridge/2016/8/25/defeating-anti-access-area-denial> on 05 June 2017

c. Current Scenario. Over the past two decades, China, Russia, Iran, and others have developed anti-access and area denial (A2/AD) capabilities such as ballistic and cruise missiles, offensive cyber weapons, electronic warfare, and more. The importance of addressing A2/AD, however, reaches far beyond Taiwan. Chinese A2/AD directly influences the balance of power in the South China Sea and throughout the western Pacific, as China continues to use its new military strength to reveal aspirations of regional leadership and global relevance. In addition, proliferation trends indicate that imbalances created by A2/AD are not limited to China, as fourteen other countries possessed S-300 SAMs as of 2009. While Iran is not believed to currently operate the S-300, they have been seeking modern A2/AD technology since the mid-1990s. Iranian A2/AD assets positioned near the Strait of Hormuz would similarly alter the balance of power in the Middle East by denying other's access to the Persian Gulf, and is just one example of the danger of A2/AD proliferation.

d. Measures Against A2/AD Capabilities. As a defending force, we also need to understand the measures that may be adopted to defeat A2/AD strategy. The strengths of A2/AD of a defending force may prevent an invading forces from attacking many centers of gravity (COGs) of the defender directly. However, since area denial weapons are often expensive and limited in number, it is difficult for the defender to simultaneously defend multiple decisive points across a large geographic area. In such scenario, indirect approaches will be critical to invader's military success. Invading commanders would therefore be attempting to consider suitable ways to exploit defender's critical vulnerabilities not protected by A2/AD "to gain leverage over its COGs," such as attacking command and control facilities and severing lines of communication (LOCs). One example of an indirect approach is to attack merchant shipping. Considering this factor, we need to ensure that our critical vulnerabilities are kept to a lowest level possible.

Chinese Model

Chinese anti-access capacity includes a large ballistic missile force designed to attack key point targets, such as air bases and naval facilities. Chinese area denial capabilities consist of advanced counter-maritime and counter-air systems designed to destroy critical mobile assets, such as, surface ships and aircraft. A2/AD also extends into the space and cyber domains that support US operations, and is specifically designed to disrupt US power projection. Furthermore, Chinese A2/AD is particularly well suited for use against US forces in the event of a confrontation over the defense of Taiwan.

Chinese analysis of Operation DESERT STORM observed that one of the key elements of US success was its ability to deploy forces into theater with little risk of hostile interference. Chinese military leaders concluded that in the event of a war with the United States, the US military deployment process must be disrupted or neutralized, and have successfully developed and fielded military capabilities designed to fulfill this need. Modern A2/AD differs from historical iterations of anti-access due to the combination of increased range, accuracy and lethality of China's advanced, networked weapons systems. Chinese A2/AD not only deters US military deployment into the western Pacific, but also promises to disrupt combat forces operating in and around locations such as Taiwan or the South China Sea.⁸

Bangladesh Perspective

A2/AD strategy should be a pertinent concept in our defence planning. Since, our defence policy does not encourage to become an aggressor, we need to have a defensive arrangement that makes a potential aggressor's life difficult. Confronting an adversary head to head is an expensive option for us, specially against a superior adversary. Therefore, A2/AD strategy seems suitable option for us. Secondly, geography is key to any discussion on A2/AD and our geography also supports adoption of such strategy. Bay of Bengal, due to its conical shape, offers excellent opportunity to set up A2/AD elements across the

8. Major Christopher J. McCarthy, op cit, p-3

coast. We have to remember that Bay of Bengal is our only opening to communicate with outside world. Due to our very location in the Bay, we are vulnerable to be blockaded and in such situation we will be left with very little option. The 1971 war also demonstrated this vulnerability, where the blockade enforced by Indian Navy proved to be a crucial blow to the Pakistani Forces operating in Bangladesh. In any similar scenario, we need to make sure that adversary does not get a scope to freely maneuver within our waters. Sophisticated A2/AD capabilities constituting a long-range maritime reconnaissance and strike complex covering entire bay would be ideal choice to deny access to our long and open littoral. However, in trying to strike the right balance, we must consider our geographical features, our own military-technological prowess and political limitations. We also need joint efforts among all the three services for effective implementation of the concept. Further study on the concept would crystallize our concept and come up with a plan that is most suited to our requirement.

The Core Requirements

Let us now see what we need to make such a strategy effective in our geographical reality.

a. Missiles. Our counter-maritime capabilities should constitute a major A2/AD threat to adversary's sea control effort in the area. Therefore, we need a variety of anti-ship ballistic and cruise missiles (ASBM/ASCM) that can be launched from the land. With a range that covers the entire bay, missiles may force even aircraft carriers to remain beyond distances suitable for efficient air operations, drastically reducing its effectiveness. It may seem highly ambitious for us to talk on ballistic and cruise missile as our technological prowess is yet to achieve that kind of sophistication. But, we may be encouraged by the success of countries like, Somalia, Afghanistan, Lebanon and Palestine who had very poor technological infrastructure and understanding, but indigenously developed weapons using locally available know-how and material to seriously undermine the superior capability of its stronger adversary during their armed struggle.⁹

9. 'Improving Warfare Capability Of BN – An Indigenous Approach for a Solution' - A research paper submitted by the author at DSCSC, Mirpur in 2011-12.

b. Submarine. Our submarine fleet should emerge as a credible A2/AD threat, capable to remain undetected upto lethal firing range of a adversary's HVUs. With multiple submarine types employing a variety of anti-ship weapons, our undersea force should be able to threaten adversary's freedom of action throughout the Bay of Bengal.

c. Air Defence Assets. Bangladesh can build a network of Air Defence Assests across various places of our coasts. The surface-to-air missile (SAM) network should be able to lethally engage enemy aircraft beyond 100 nautical miles. The aim should be to deny adversary from attaining air superiority for furthering their military operation. Adversary should not operate unmolested in essentially uncontested airspace.

d. Mines. We need to develop the mastery on mine warfare. Mine is the cheapest means to deny even a powerful adversary. Mere threat of existence of a minefield severely restricts adversary's maneuverability.

e. Cyber Domain. In addition to developing counter-air and counter-maritime forces, our A2/AD should also extend well beyond the traditional domains of air, sea and land. We should attain a capability to operate in cyber domain as well. The aim should be to disrupt adversary's network centric operational capability. Attacks on cyber and space targets threaten to disrupt or even completely deny multiple enablers of power projection, including but not limited to satellite communications and Global Positioning System (GPS) based navigation systems.

Cost involvement in this kind of highly ambitious planning should be a matter over which the policy makers have to decide based on the threat perception. However, considering the fact that Bangladesh is steadily progressing with her economy in recent years and any indigenous effort would significantly reduce the overall expenditure, materialisation of such vision is only a matter of time.

Conclusion

Just as Blitzkrieg changed combat in 1940, anti-access/area denial technologies and strategies have re-defined the character of modern warfare.¹⁰ A2/AD undermines any effort of power projection by denying freedom of movement and freedom of action in and around areas of interest. Though the concept has recently drawn interest, historical examples exist on the use of such strategy since long. Chinese efforts to deny US freedom of action in Taiwan waters have been identified as the modern face of A2/AD strategy. However, Iran and some other countries have been attempting to benefit from the concept.

Bangladesh, being situated in the corner most portion of the Bay of Bengal, is vulnerable to be choked or blockaded during any conflict with a superior adversary. A head on clash may be too expensive an option for us. A2/AD strategy seems a suitable option as it would make adversary's life difficult while attempting to dominate our waters. Placement of suitable A2/AD elements across our coast would surely become a serious concern for any invading adversary.

The strategy requires the use of some expensive military hardware like ballistic and cruise missiles, submarines, air defence assets etc. These will involve huge cost and high level technological prowess. But, the examples of some low tech countries in recent conflicts show that indigenous efforts are possible in developing the required weapon and sensors to frustrate a superior adversary. Considering this, Bangladesh armed forces should carry out more study on this concept and come up with a viable plan for the defence of the country.

10. Major Christopher J. McCarthy, *op cit*, p-9.

Biography of the Writer



Commander M Shamsul Haque, (G), OSP, afwc, psc, BN joined Bangladesh Navy on 01 June 1994. He was commissioned from Royal Malaysian Naval Academy in the Executive Branch in 1997 and completed diploma in 'Maritime Transportation Management' from University Technology Malaysia in 1998. He completed his specialization on Gunnery from

BNS ISSA KHAN, Chittagong. Cdr Shams served at Naval Headquarters, onboard various ships and bases of Bangladesh Navy and in inter service organisations in different capacities. Some of his appointments include Staff Officer (Naval Appointments-1) at NHQ, Commanding Officer of BNS KAROTOA, PADMA and DURDANTA, Instructor of Gunnery School, BNS ISSA KHAN and at DGFI HQ. Presently, he is serving as the Executive Officer of BNS SOMUDRA AVIJAN. The officer took part in the UN mission with Bangladesh Force Riverine Unit (BANFRU) in Sudan. He is a graduate of DSCSC, Mirpur and did his second staff course from India. He obtained his Masters degree from Bangladesh University of Professionals (BUP) and also from Madras University of India. In 2015 he completed Armed Forces War Course from National Defence College, Mirpur. He also attended Junior Officers' Command Course in Malaysia. The officer visited India, Indonesia, Malaysia, Sri Lanka, Sudan, Turkey and Uganda.

CONTROL OVER GEOGRAPHICAL CHOKEPOINTS AND CANALS : AN ASSURANCE OF SECURE LIFELINE

Commander M Mehadi Amin Miah, (G), psc, BN

Preamble

“.....for whosoever commands the sea, commands the trade, whosoever commands the trade of the world commands the reaches of the world and consequently the world itself.”

A 15th century English soldier, a qualified intelligence agent and later a British politician Sir Walter Raleigh mentioned those lines on his autobiography published 200 years after his death.¹ Though Sun Tzu was the pioneer on art of war strategy on battlefield but Sir Walter Raleigh was the pioneer to shift the focus of war more on economic control through sea. Later on 18th century US Admiral Alfred Thayer Mahan supplements the concept of sea power of a nation with few credentials like, geographical position, physical conformation, number of population, national character, character of government and most importantly extent of territory.

In 21st Century Geoffrey Till, Eric Groove and Milan Vego further simplifies the intent of superpowers at sea on developing sea power. They clearly signifies the aspect of Critical requirement (CR) and critical vulnerability of (CV) of any achievable Centre of Gravity (CG). Last decade strategist Collin S Grey and Charles Hadfield mentioned about the control over geographical choke points and significant canals of the world are the CV to gain control over trade of the world. In today's world economic security assures stability of government.

Aim

In this paper the major geographical chokepoints of the world along with few canals will be briefly presented with their controlling authority. From this paper readers will have an assessment on nation's interest of geographical choke points and canals and their brief history. Besides, assessment given on the politico-economic outcome of geographical chokepoint and canal control by the power playing nations.

Geographical Chokepoints

From ancient time explorers and military people travelled different land for living. In course of time this natural need institutionalized through trade and commerce. Complementary interest rose through exchange mode of trade but contradictory condition developed with coercive military might in pursuit of wealth. Explorers tried to look for geographical shortest way to save time and energy. Thereby, the major geographical chokepoints of the world have become so significant both from geo-political and geo-strategic perspective.

There are approximately 200 straits (narrow bodies of water connecting two larger bodies of water) or canals around the world but only a handful are known as chokepoints. A chokepoint is a strategic strait or canal which could be closed or blocked to stop energy flow. This type of aggression could surely cause an international incident. In 1982 the Law of Sea Conventions further protected the international access for nations to sail through straits and canals and even ensured that these passageways are available as aviation routes for all nations.²

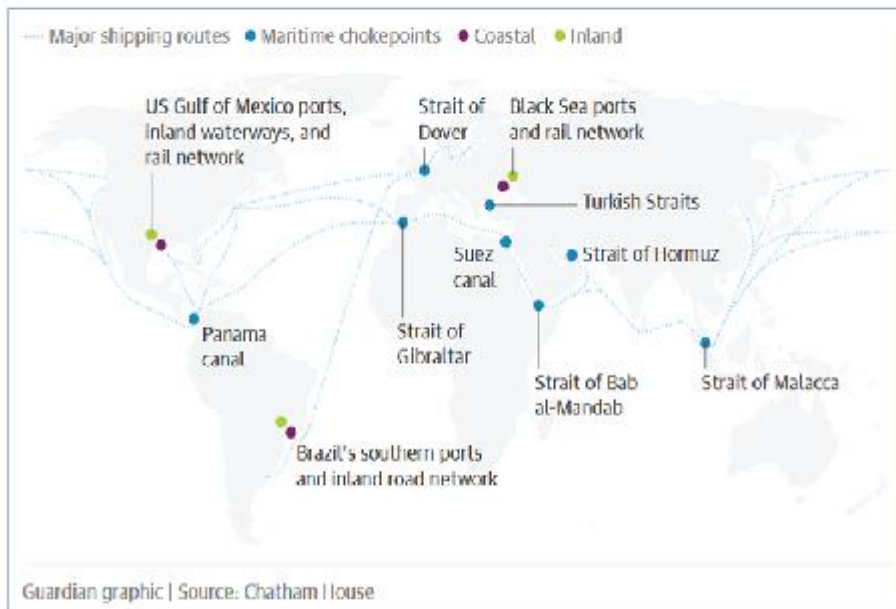


Fig 1 : Global Maritime Chokepoints
(<http://www.bbc.com/news/world-40415756>)

The world's oceans account for nearly 90 percent of all international commerce. Straits are geographical areas littered across the oceans near land masses that constrict the passage of shipping to narrow passages. These straits often serve as strategic chokepoints that offer potential control of the world's sea lanes of communication. Because international shipping lanes are forced to go through these specific vulnerable locations, they are often referred to as the 'Geographical Achilles heels of the global economy.' Many straits are in close proximity to politically unstable nations, which increases navigation risks and compromises access and use. These strategic passages can be mined, blocked by sinking ships, or interdicted by naval forces, artillery or missile systems.³

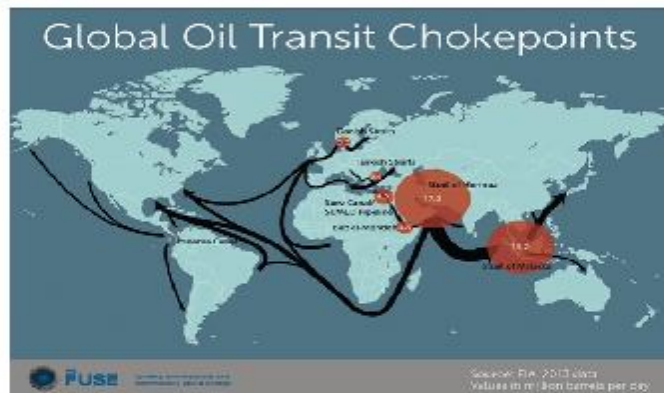


Fig 1A : Global Oil transit Chokepoints and energy flow: million barrel/day
(<https://energyfuse.org/infographic-the-worlds-oil-transit-chokepoints/>)



Fig 1B : Global Oil production and Consumption flow: million barrel/day
(<https://acglobalenergy/status/727130780351254528>)

Major Geographical Chokepoints

There are few geo-strategic oil chokepoints throughout the world, and a closure or disruption to any one of them could cause unpredictable price fluctuations. Fortunately, these locations are generally safe and are kept clear by the international community, whose economies and standards of living depend on these chokepoints remaining clear. Uncertainty over maritime security can lead to a global shift in oil prices. If one of these chokepoints were disrupted, ships would need to travel additional thousands of miles to reach an alternate route. The major chokepoints have been discussed here in order of oil flow.

Strait of Hormuz

The Strait of Hormuz is the world's primary oil chokepoint. According to the EIA, 17 million barrels of oil, representing 30% of all maritime-traded petroleum, passed through the strait each day in 2015. Oil from Saudi Arabia, the UAE, Qatar, Iran, and Iraq all pass through the strait and head mostly towards Asia, although tankers can also head west towards the Suez Canal and the Red Sea.



Fig 2 : Global Oil flow in Hormuz Strait
(<https://www.google.com/search?hl=en&authuser>)

The Strait of Hormuz is able to accommodate the largest oil tankers in the world. The mercury of tension rising centering this strait as US and its allied domination often challenged by Iran, China and Russia. Recent Qatar issue further tightened the situation of flow at Hormuz. This is a 47 km strait between Bandar Abbas port of Iran and Kumzar island of Oman. British SOLAS station at Al Jeer port of UAE and safe energy traffic station of US coalition forces

established on Khasab port of Oman. US and UK maintains strong military ties with Saudi Arabia, Oman and UAE for active control of the Strait of Hormuz.

Strait of Malacca

The Strait of Malacca is the shortest waterway which connects the Indian Ocean to the South China Sea and the Pacific Ocean. In 2015, the EIA estimated that 15.2 million barrels of oil a day passed through the strait with the fuel from the Middle East primarily heading towards Indonesia, China, and Japan. The Strait of Malacca is also one of the most narrow chokepoints in the world. The narrowest point in the strait is only 1.7 miles wide, which creates a natural bottleneck for shipping. The Strait is 805 km (500 mile) stretched between Peninsular Malaysia (West Malaysia) and the Indonesian island of Sumatra. At Phillips Channel close to the south of Singapore, the Strait of Malacca narrows to 2.8 km (1.5 nautical miles) wide, creating one of the world's most significant traffic chokepoints.⁵



Fig 3 : Crude Oil flow through Malacca Strait
(<https://www.cia.gov/todayinenergy/detail.php?id=10671>)

It is named after the Empire of Melaka that ruled over the archipelago between 1414 to 1511. From an economic and strategic perspective the Strait of Malacca is one of the most important shipping lanes in the world. The strait is the main shipping channel between the Indian Ocean and the Pacific Ocean, linking major Asian economies such as India, China, Japan and South Korea. Over 50,000 vessels pass through the strait per year, carrying about one-quarter of the

world's traded goods including oil, Chinese manufactures, and Indonesian coffee. About a quarter of all oil carried by sea passes through the strait.⁶ The narrowest point of this channel is about 22 km between Malaysia's Port Dickson and Indonesian Island of Pulau Rupa.

Cape of Good Hope

The Cape of Good Hope, the crossing at the southernmost tip of Africa, is not technically a chokepoint since it is open on one side. But the area is a critical trade route. In 2013, the route around the Cape saw trading of 4.9 million barrels of oil a day, approximately 9% of the total maritime oil trade. In 2013, total 3.6 M/bd of crude oil around the world moved eastbound, originating mostly from Africa (2.1 M/bd) and from South America and the Caribbean (1.3 M/bd). Eastbound crude oil flows were nearly all destined for Asian markets (3.5 M/bd). In the opposite direction, nearly all westbound flows originated from the Middle East (1.3 M/bd), mostly destined for the Americas, with the United States making up a majority of the total.

There is a very common misconception that the Cape of Good Hope is the southern tip of Africa, because it was once believed to be the dividing point between the Atlantic and Indian Oceans. In fact, the southernmost point is Cape Agulhas, about 150 kilometres (90 mi) to the east-southeast. The Atlantic and Indian oceans meet at the point where the warm-water Agulhas current meets the cold-water Benguela current and turns back on itself – a point that fluctuates between Cape Agulhas and Cape Point, about one kilometer east of the Cape of Good Hope. When following the African coastline from the equator, however, the Cape of Good Hope marks the psychologically important point where one begins to travel more eastward than southward. Thus the first rounding of the cape in 1488 by Portuguese explorer Bartolommeo Dias was a major milestone in the attempts by the Portuguese to establish direct trade relations with the Far East.⁷



Fig 4 : Oil flow through Cape of Good Hope
(<https://www.cia.gov/todayinenergy/detail.php?id=10671>)

The Cape of Good Hope also functions as the secondary route for oil if the primary chokepoints of the Suez Canal or the Bab el-Mandab were closed. But according to the EIA rerouting oil around the cape would increase cost considerably as it would add an additional 2,700 miles of transit from Saudi Arabia to the US.

Bab el-Mandab

Only 18 miles wide at its narrowest point, the Bab el-Mandab connects the Red Sea to the Gulf of Aden and ultimately to the Indian Ocean. Instability or closure of the waterway could force tankers to have to travel around the southern tip of Africa. Crucially, the EIA notes, the vast majority of southbound traffic through the Suez Canal must also pass through the Bab el-Mandab, so the closure of the waterway could have a cascade effect.⁸



Fig 5 : Traffic lane through Bab-el-Mandeb Choke point
(<http://susris.com/2015/04/14/the-bab-el-mandeb-maritime-chokepoint>)

In 2015, 3.8 million barrels of oil passed through the waterway each day. Oil prices took a recent jolt after the Yemeni government collapsed, raising the possibility of a security crisis in the Bab el-Mandab. The narrowest passage of the chokepoint is 12 km between former French colony Djibouti and Perim island of Yemen. After 2012 UK invested on hotel tourism in Perim island of Yemen.

Danish Straits

The Danish Straits, formed out of a series of channels passing around Danish Islands, is among the most secure oil chokepoints in the world. The chokepoint connects the Baltic Sea in the east to the North Sea in the west. Approximately, 3.3 million barrels of oil a day flowed through the region in 2013. Despite rising tensions with Russia in Europe, and particularly the Baltics, shipping is unlikely to be affected by regional security issues. The EIA estimates that 42% of all oil shipped through the Danish Straits originated from the Russian port of Primorsk in 2013 to the West. A small amount of Norwegian and British oil also went through the straits to the Baltics.⁹ But if Russia ever blockaded the Strait, it would mostly just be blockading its own oil trade as well.



Fig 6 : Traffic lane through Danish Strait
(<https://www.trafficlist.net/lyngby-radio-oxz>)

Strait of Gibraltar

The name Gibraltar is the Spanish derivation of the Arabic name Jabal Ṭariq, meaning "Mountain of Tariq". It refers to the Rock of Gibraltar, which was

named after the Umayyad general Tariq ibn-Ziyad. An Anglo-Dutch force captured Gibraltar from Spain in 1704 during the War of the Spanish Succession on behalf of the Habsburg pretender to the Spanish throne. The territory was subsequently ceded to Britain "in perpetuity" under the Treaty of Utrecht in 1713. The sovereignty of Gibraltar is a major point of contention in Anglo-Spanish relations as Spain asserts a claim to the territory. Gibraltarians overwhelmingly rejected proposals for Spanish sovereignty in a 1967 referendum and again in 2002. Under the Gibraltar constitution of 2006, Gibraltar governs its own affairs, though some powers, such as defense and foreign relations, remain with the responsibility of the UK Government.



Fig 7 : Strait of Gibraltar
(<http://attyreyedar.blogspot.com/2014/08/rock-of-gibraltar.html>)

The Strait of Gibraltar is a narrow body of water between Spain and Britain that connects the Mediterranean Sea with the Atlantic Ocean. Though the strait having a continuous coast of Morocco but Britain shares the critical entry point of Spanish land and Spain holds the south-eastern part Morocco. Around 300 cargo vessels pass through the Strait every day. In spite of the heavy concentration of shipping traffic and the noise caused by it, there is still an abundance of whales and dolphins in these waters. The Rock is Crown property of the United Kingdom, and borders Spain.¹⁰ The sovereignty of Gibraltar was transferred from Spain to the Kingdom of Great Britain by the Treaty of Utrecht in 1713 after the War of the Spanish Succession.

Bosporus

A strait of Bosphorus/Turkish Straits is a 17-mile-long waterway with only 1 km wide, which connects the Black Sea with the Mediterranean Sea and supplies Western and Southern Europe with oil from the Caspian Sea. The strait is made up of the Bosphorus and Dardanelles and divides Asia and Europe. The Bosphorus joins the Black Sea with the Sea of Marmara and the Dardanelles connects the Sea of Marmara and the Mediterranean Sea. Straits of Bosphorus is the world's narrowest strait used for international navigation. The Straits are governed under the Montreux Convention, which gives Turkey control over the Bosphorus and the Dardanelles. While Turkish maritime authorities have the right to levy tolls on the passing tankers and is also responsible to check ships for sanitary conditions and safety,¹¹ the Bosphorus and Dardanelles Straits are considered international waterways and Turkey is prohibited from restricting their use during peace time.



Fig 8 : Strait of Bosphorus
(<http://www.bosphorustour.com/Currents-Bosphorus-Water.html>)

The Bosphorus is a narrow stretch of water that divides both Asia from Europe and splits Istanbul's European and Asian halves. The chokepoint connects the Black Sea to the Mediterranean. In 2013, approximately 2.9 million barrels of oil a day flowed through the Bosphorus, with the petroleum coming from Russia, Azerbaijan, and Kazakhstan. According to the EIA, Russia has slowly been shifting its exports to the Baltics while Azerbaijan and Kazakhstan have further increased shipping through the chokepoint. The Bosphorus is only a

half mile wide at its narrowest point, and around 48,000 vessels travel through the waterway a year.

Major Manmade Canal as Chokepoints

There are few manmade-strategic chokepoints throughout the world. Since these chokepoints are manmade, they represent strong economic and political intention of state government with regional influence. Closure or disruption to any one of them could cause unpredictable price fluctuations of commodities and energy. Therefore, these choke points became the vital regional lifelines exhibiting supreme strategic importance. Economic superpowers also influencing states to have more manmade canals to dominate regional economic growth and establish own interest. Military movement and positioning along the canals further secures the interest of influencing nation and disrupt the interest of other states. Uncertainty over maritime security can lead to a global shift in oil prices. If one of these chokepoints were disrupted, ships would need to travel additional thousands of miles to reach an alternate route. The major manmade canals are appended below in order of shipping flow :

Suez Canal

Suez Canal is an artificial sea-level waterway in Egypt, connecting the Mediterranean Sea to the Red Sea through the Isthmus of Suez. Constructed by the Suez Canal Company between 1859 and 1869, it was officially opened on November 17, 1869. The canal offers watercraft a shorter journey between the North Atlantic and northern Indian Oceans via the Mediterranean and Red seas by avoiding the South Atlantic and southern Indian oceans, in turn reducing the journey by approximately 7,000 km (4,300 mi). It extends from the northern terminus of Port Said to the southern terminus of Port Tewfik at the city of Suez. Its length is 193.30 km (120.11 mi) including its northern and southern access channels.¹²

Control over Geographical...



Fig 9 : Suez Canal

(<http://www.npr.org/sections/thetwo-way/2017/06/14/532960178>)



Fig 10 : Suez Canal Development

(<http://english.alarabiya.net/en/perspective/2015-Egypt-s-Suez-Canal>)

In 2013, a record of 3.2 million barrels of oil a day passed through the canal, mostly to markets in Europe and North America. According to the EIA, the Suez Canal was expanded in 2010 to allow 60% of all tankers in the world to effectively pass through. The fall of dictator Hosni Mubarak in Egypt in 2011 and the resulting unrest did little to deter shipping through the canal. But security remains a primary concern and in September 2013 terrorists planned a failed rocket attack on cargo ships passing through the region. In 2012 total 17,225 vessels traversed the canal which means 47 vessels per day. In August 2014, construction was launched to expand the speed of canal's transit time to double the capacity of the Suez Canal from 49 to 97 ships a day. The "New Suez Canal", as the expansion opened with great fanfare in a ceremony on 6 August 2015.¹³

Panama Canal

United States commenced building a canal across a 50-mile stretch of the Panama isthmus in 1904. Chief engineer John Stevens devised innovative techniques and spurred the crucial redesign from a sea-level to a lock canal. His successor, Lt. Col. George Washington Goethals, stepped up excavation efforts of a stubborn mountain range and oversaw the building of the dams and locks. The Canal opened in 1914, oversight of the world-famous Panama Canal was transferred from the US to Panama in 1999. The Panama Canal is strategically important to the United States because it is a rapid link between the east and west coast, saving approximately 13000 km (from 21000 km to 8000 km). It is comprised of three main elements, the Gatun Locks (Atlantic Ocean access), the Gaillard Cut (continental divide) and the Miraflores Locks (Pacific Ocean access). The Panama Canal connects the Pacific Ocean to the Caribbean and ultimately to the Atlantic¹⁴. According to the EIA, the Panama Canal transported 1.4% of all oil and petroleum products globally in 2013. This amounted to approximately 0.85 million barrels of oil a day in 2013. The utility of the canal has waned in the years since it was built.



Fig 11 : Panama Canal Operation.
(<http://marinersgalaxy.com/2015/06/panama-canal-history>)



Fig 12 : Economic benefit of Panama Canal.
(<http://marinersgalaxy.com/2015/06/panama-canal-history>)

Today, the narrowest point of the Panama Canal is only 110 feet wide at its narrowest point, forcing larger super-tankers to avoid the canal entirely. The canal is undergoing an expansion project which should enable larger tankers to pass through the region more easily. USA will fund the expansion project of Panama Canal to ensure safe passage of her super tankers and Aircraft Carriers. Political negotiation underway to attain more benefit from Panama and early completion of development project by 2022.¹⁵

Kiel Canal

The canal, built between 1887 and 1895, initially served German military needs by eliminating the necessity for ships to travel northward around the Danish peninsula. It was enlarged between 1907 and 1914 to accommodate large naval ships. Prior to World War I the canal (then known as the Kaiser-Wilhelm Canal) was owned by the German government. The Treaty of Versailles (June 28, 1919) laid down regulations that, in effect, internationalized the canal, while leaving it under German administration. Traffic on the canal was subject only to general police, shipping, sanitary and customs regulations. These provisions were repudiated by Adolf Hitler in 1936. Since World War II the conditions of the Treaty of Versailles guaranteeing freedom of navigation have again been practised.¹⁶ The canal remains an important route for Baltic shipping.



Fig 12 : German Kiel Canal.
(<https://www.britannica.com/topic/Kiel-Canal>)

The canal has been enlarged twice and is today 160 meters (526 feet) wide and 11 meters (37 feet) deep and is spanned by seven high-level bridges that have about 43 metres (140 feet) of clearance for ships beneath them. The locks are 45 metres (146 feet) wide by 327 metres (1,072 feet) long. The canal constitutes the safest, most convenient, shortest, and cheapest shipping route between North Sea and Baltic Sea. This canal gives the quickest access route to all the rim nations of Baltic Sea like Poland, Lithuania, Latvia, Estonia, Finland and Moscow.

Future Endeavor on Canal as Chokepoints

There are few natural chokepoints new world order will ponder out. Complementary and conflicting interest will open the avenue to think for the execution of new manmade canals. Few future planning of economic giants trying to ensure their interest through Geographic and manmade canal development are given below :

Strait of Tiran

The Straits of Tiran are the narrow sea passages between the Sinai and Arabian peninsulas which separate the Gulf of Aqaba from the Red Sea proper. The distance between the two peninsulas is about 13 km. After the 1956 war, Egypt agreed to reopen the Straits of Tiran to Israeli shipping, whose closure had been a significant catalyst in precipitating the Suez Crisis. It has two passages deep enough to be navigable by large ships. The Enterprise passage, 290 metres (950 ft) deep, is adjacent to the Egyptian side, while the 73-metre (240 ft) deep Grafton passage, surrounded by shallows, is to the east, nearer to the island of Tiran. To the east of Tiran, between it and Saudi Arabia, the other strait has reefs and shallows with a single channel 16 metres (52 ft) deep.¹⁷



Fig 13 : Israeli Lifeline Strait of Tiran.
(<https://earthobservatory.nasa.gov/IOTD/view.php?id=81772>)

Access to Jordan's only seaport of Aqaba and to Israel's only Red Sea seaport of Eilat is through the Gulf of Aqaba, which gives the Straits of Tiran strategic importance. In 1967, 90% of Israeli oil passed through the Straits of Tiran, making it a target of Egyptian blockade during the Arab League boycott of Israel. In May 1967, Israeli Prime Minister Levi Eshkol repeated declarations that Israel had made in 1957, saying that closure of the Straits of Tiran would be an act of war. Spiritually, the route of Exodus gives this strait an added value to Jews¹⁸ yet, Israeli life line Tiran will be protected by her allies in the name of Maritime security.

Nicaragua Canal

This canal is the extent reach of China's string of pearls which negotiates with Nicaraguan government to have an alternative manmade canal other than Panama Canal. On 26 September 2012, the Nicaraguan Government and the newly formed Hong Kong Nicaragua Canal Development Group (HKND) signed a memorandum of understanding that committed HKND to financing and building the "Nicaraguan Canal and Development Project." HKND Group is a private enterprise¹⁹. The Nicaraguan Government subsequently approved the Master Concession Agreement with HKND on 13 June 2013, thereby, granting "the sole rights to the HKND Group to plan, design, construct and, thereafter, to operate and manage the Nicaragua Grand Canal and other related projects, including ports, a free trade zone, an international airport and other infrastructure development projects."



Fig 13 : Panam's Alternative Nicaragua Canal.
(<http://www.globaltimes.cn/content/898353.shtml>)

The country has been waiting for the project's completion and a chance to compete with the Panama Canal. This Special Law for the Development of Nicaraguan Infrastructure and Transport to the Canal and Free Trade Zones allow for the construction of the project, which is estimated at US \$50 billion. The agreement establishes that the Canal will have its own special operation team with immunity to Nicaraguan law, and HKND descendants will be the owners of the Canal until the year 2129.

Ranong Canal

Ranong is located 586 kilometers south of Bangkok and is the first southern province that is located on the Andaman Sea. The narrowest part Ranong province of Thailand is only 44 kilometers which gives explicit chance for any country to invest on manmade canals. China showed interest on this project which may challenge and incapacitate the shipping flow of Malacca strait. If this canal is established, it may transform the economic posture of Thailand.



Fig 13 : Ranong-Chumphon Canal.
(<https://books.google.co.uk/books?%Thailand%20Ranong%20Canal>)

Thailand is seeking investments to build a Canal Zone through the provinces of Ranong and Chumphon. This will shorten the trip from the Middle East by couple of days by skipping the strait of Malacca. International energy flow duration will be reduced by a day with distance reduction of 2300 km toward China and East Asia. Japan is interested but China is ready to invest and start the project by 2022 but political clearance need to be accorded from China's policy making level beforehand.²⁰

Conclusion

At the dawn of the 15th century, Sir Walter Raleigh recognized the strategic importance of oceanic chokepoints for commercial trading vessels in times of peace and have enhanced the military power of their occupiers in times of war. However, in course of time, structural changes in the shipping industry have had significant consequences for strategic chokepoints, especially the two great canals. Over the last 25 years, the real cost of sea transportation fell by 80% because larger ships generated economies of scale, containerization reduced labor costs, and information technology improved resource allocation. The rise of super tankers and post-Panamax container ships has significantly diverted traffic from the Panama Canal and has motivated the Egyptian government to approve a 10-year, \$441 million project to widen and deepen the Suez Canal. The development of railway transshipment in Suez and Panama and competition from rail and truck transportation in North America and Europe may further undermine the commercial value of strategic waterways. Moreover, most products of information industries cost very little to transport, even by airplane, and sometimes can be “exported” abroad via the Internet.

Growing demand and squeezed supplies are unavoidable consequences of the geography of petroleum production, distribution and consumption. The global economy is beginning to realize the full extent of a growing shortage of oil and its inherent economic and geopolitical costs. Current estimates place the peak of global oil production at around 2008-2010. In the meantime, oil consumers are struggling to diversify their oil supplies, but most of the remaining oil reserves are predominantly in the Middle East, a region which will remain the focal point of global oil shipments. Although there is a current energy shift towards renewable and environmentally-friendly resources, such as natural gas and eventually hydrogen, the move from petroleum is likely decades away. Even a transition to natural gas, the reserves of which are substantial, would be very costly since entirely new distribution infrastructures would be required, including additional LNG carriers, terminals and processing facilities. Meanwhile, an era of insecurity and vulnerability is likely to prevail as

petroleum circulation increases, with strategic chokepoints bearing the brunt of the tension. Like the limited additional petroleum production capacity, the circulation capacity, which is mainly dictated by the chokepoints of oil circulation, leaves little room for additional growth. These geographical constraints cannot be bypassed easily and will be a significant factor in global insecurity of oil supplies in terms of who will get preferential access to these limited resources. The situation is likely to become very tense among large consumers, such as the United States and China during the second decade of the 21st century, as they compete, while the outlets of the Middle East handle the last large volume supply routes of the petroleum era. Since additional economies of scale in maritime shipping are difficult to achieve and since alternative routes, including pipelines are limited and insecure, so, world economic power seeks alternative ways and routes through new manmade canals to secure their energy flow. Thereby, solutions for petroleum distribution, namely the use of chokepoints will demand rationalized use for the wellbeing of world peace.

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Biography of the Writer



Commander M Mehadi Amin Miah, (G), psc, BN was commissioned in BANGLADESH NAVY on 1st Jul 1999. He did his basic training from Royal Malaysian Navy. He has completed his Missile Command Course and Maritime Warfare & Tactics course from SMWT and specialization on Gunnery from BNS ISSA KHAN. He has qualified his staff course from Defense services command and staff college, MIRPUR Dhaka. During his career he has served BNS ALI HAIDER, BNS OSMAN, BNS MADHUMATI, BNS NIRBHOY, MISSILE BOATS and 41 PCS in different capacities. Beside seafaring tenure onboard ships, he has completed his mission in SUDAN as a member of Force Riverine unit BANFRU-6. He has commanded Missile Boats and 41 PCS. He has served in Armed Forces Division in Operations directorate as G-2, Ops navy and Secretary to PSO AFD for three years. He is a graduate from University Technology Malaysia (UTM) on Maritime Defense and Transportation. At present, he is serving as the Executive Officer of Naval armament depot BNS BHATIARY.

PROPOSED SECURITY STRATEGY FOR THE SEA PORTS AND SEA LINES OF COMMUNICATION OF BANGLADESH

Commander M Yousuf Alam, (L), psc, BN

Introduction

Bangladesh is a small littoral country of the Bay of Bengal. Geographically, Bangladesh is being surrounded by India and Myanmar in three sides. Her southern part is open to sea with about 710 km of coastline. Ports and Sea Lines of Communication (SLOC) are recognized to be the economic life line of Bangladesh. It is to be mentioned that more than 90% of trade is carried over sea. Bangladesh has two major sea ports, namely, Chittagong and Mongla. Another major port is under construction named 'Payra Port'. Bangladesh government is planning to construct a deep sea port which could be the regional hub for her strategic location.

The economy of Bangladesh is largely depended on her ports and SLOCs. Therefore, it is imperative to ascertain the rights over the sea and keep the SLOCs open during peace and war. As such, the protection of the sea ports and the SLOCs is vital for the very existence of the country from the traditional and non-traditional threats. The non-traditional threats are fluid in nature and most of them bear transnational implications. These types of threats are terrorism, smuggling, arms and human trafficking, pollution, piracy etc. Traditional threats in maritime environment have direct impact on ports which hinder overall security system. The existing security systems of the ports are working satisfactorily. To sustain ports' economic activities, a comprehensive security strategy is needed for the ports and SLOCs.

Maritime agencies including Bangladesh Navy (BN) can play an important role to ensure strong security of the ports and SLOCs in peace and war. BN has been entrusted with this major role to protect ports and SLOCs and to keep those open in peace and war.¹

1. Maritime Doctrine of Bangladesh, Directorate of Naval Plans, Naval Headquarters, Dhaka, Bangladesh, 2012., p. 67.

Various forces and security agencies are ensuring the physical protection of the ports. With the changing mode of threats, policy and arrangements also need to be changed and adjusted accordingly. It is a need of time to formulate a comprehensive security strategy taking all concerned agencies under the same umbrella. Considering the importance of maritime trade as the lifeline of the country's vital economy and survivability, Bangladesh needs to mitigate all challenges.

This paper will describe the maritime heritage, importance of the sea ports and the existing security arrangements. Thereafter, various traditional and non-traditional threats of Bangladesh will be analyzed. Basing on the threats, the role of maritime agencies and other organizations will be highlighted. Considering all the facts, present security arrangements, a comprehensive port and SLOC security strategy will be revealed with probable challenges and their mitigations.

Aim

The aim of this paper is to propose a security strategy for the sea ports and SLOCs of Bangladesh.

Maritime Heritage of Bangladesh

Bangladesh has a significant maritime heritage which can be traced long back from the history. With one of the largest river networks, one of the largest bays, largest delta, longest unbroken sea beach, one of the oldest sea ports, ancient wooden shipbuilding heritage and recent ocean going shipbuilding impulse – Bangladesh is truly a maritime country. 'Made in Bangladesh' wooden ships had been used in Turkey, China, Portugal and Germany during 13th-18th centuries.²

About 25% of total population of Bangladesh lives along the coast line and many of them are directly dependent on the sea for their livelihood.³ Coastal

2. <http://macademy.gov.bd/historical-background/> retrieved on August 02, 2017.

3. Agro-economy of coastal Bangladesh, published in The Daily Star on November 23, 2014.

inhabitants are relying on agriculture, fisheries, salt panning etc for their livelihood sustenance.⁴ The marine area of Bangladesh is not only important for its significant economic role but also for its unparalleled natural panorama and attractive appeal.

Sea Port and Sloc of Bangladesh

Chittagong Port

History and Importance. The history of Chittagong Port can be traced back to the 4th century BC. In the 16th century, Portuguese sailors took great interest in the locality around Chittagong which was popularly known as 'PORTE GRANDE'. With the promulgation of the Indian Port Act 1908, the ports of the Indian subcontinent were henceforth administered.⁵ On 16 Dec 1971, the port of Chittagong emerged as the principle port of the sovereign state of Bangladesh. Chittagong Port is the principal seaport of Bangladesh handling about 92% of import-export trade of the country. The Chittagong port handled record of 2 millions of Twenty-Foot Equivalent Units (TEU) of containers in year 2014-15.⁶ It is the 86th busiest port in the world as per Lloyd's Register in the year 2013-14.⁷

Port Infrastructure

Shed and dumps for handling goods other than berths and jetties at the Chittagong port⁸ are as follows :

Area	Number	Size (Square Metres)
Transit sheds 1-9	9	64,364.70
Warehouses D,F,P,O	4	20,712.41
Car Sheds (P Shed & F Shed)	2	8,696.63
Open Dumps	-	90,000.00
Warehouses (Outside Protected Area)	6	25,179.36

Table 1. Sheds and Dumps of Chittagong Port
(Source: <http://cpa.gov.bd/>)

4. Integrated Coastal Zone Management Plan (ICZMP) of Bangladesh, 2005., p. 7.

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6. <http://archive.dhakatribune.com/bangladesh/2016/jan/03/ctg-port-makes-record-20-lakh-teu-ontainer-handling> retrieved on August 01, 17.

7. <http://www.thefinancialexpress-bd.com/2015/01/10/75152> retrieved on August 03, 2017.

8. <http://cpa.gov.bd/> retrieved on 29 July 2017.

Existing Security Arrangement

Security measures have undertaken by Chittagong Port Authority (CPA) for enforcing International Ship and Port Facility Security (ISPS) Code. Briefly existing security arrangement of Chittagong Port is described below :

- a. Security in the port is maintained round the clock by specially trained armed port security personnel. In addition to security personnel, Bangladesh Ansar is also deployed for strengthening the security.
- b. Personnel access control is maintained with Proximity Access Control System (PACS), Archway, Hand Metal Detector, Baggage Scanner etc and vehicle search is carried out with fixed Under Vehicle Inspection System (UVIS).
- c. Trained watchmen are deployed onboard ships to ensure security of ships staying in port area.
- d. River area patrol is carried out with speed boats by port security personnel.

Mongla Port

History and Importance

In 1953, Sir Claude English came for surveying Pussur-Sibsa river basin and recommended to shift the Chalna anchorage about 16 km downstream from Chalna Bazar. Accordingly, Chalna anchorage was shifted to Mongla between Mongla Nulla and Pussur River. Thereafter, present site was selected for constructing permanent port facilities. Finally, five jetties were constructed with necessary back up facilities. On 24 March 1982, Chalna Port Authority was renamed as Port of Chalna Authority and on 08 March 1987 found its present name Mongla Port Authority (MPA).⁹ Mongla Port provides service to international shipping lines and other concerned agencies. For the development of shore based facilities like jetties, sheds etc and total 29 development projects have been implemented.

9. <http://www.mpa.gov.bd/> retrieved on August 06, 2017.

Port Infrastructure

Sheds and dumps other than berths and jetties for handling goods at the Mongla Port¹⁰ are as follows :

Area	Number	Size/Capacity
Container yard	4 Nos.	35754 Sq. m.
Transit Shed	4 Nos.	7500 Metric Ton
Warehouse	2 Nos.	15000 Metric Ton
Car Parking yard	2 No.	2000 Car (About)
Open dumps	-	2000 Car (About)

Table 2. Sheds and Dumps of Mongla Port
(Source : <http://www.mpa.gov.bd/>)

Existing Security Arrangement.

To counter any kind of threat, port authority is remaining vigilant at all time. Briefly existing security arrangement of Mongla Port is described below :

- a. Security in the port is maintained round the clock by trained port security personnel.
- b. Port security department's intelligence branch is monitoring the activities of the port safety and security threats constantly.
- c. Various equipment is being used to ensure security, such as patrol cars, patrol boats, flood lights, watch towers, Close Circuit Television (CCTV), metal detectors etc.

Payra Port

Construction works of country's third seaport is undergoing at Patuakhali beside Payra River. CPA has already signed a Memorandum of Understanding (MoU) with Payra Port Authority (PPA) to provide monetary, technical and human resources assistance. Hopefully, the fisheries, agriculture and manufacturing industries will be directly benefited by the construction of the third port.

10. <http://www.mpa.gov.bd/> retrieved on August 05, 2017.

Proposed Deep Sea Port

Deep sea port development will have positive impacts on employment and revenue earnings of a country. A narrow deep strip of the bay with a natural depth of 14m has protruded close to the Sonadia Island.¹¹

SLOCs of Bangladesh

Bangladesh has two recognized SLOCs. One is west bound SLOC towards India and Sri Lanka. The other SLOC is east bound towards Myanmar, Thailand and Singapore etc.

Role Of Maritime Agencies and other Organizations for Defending Sea Ports and Slocs Of Bangladesh

Bangladesh Navy

As per Ministry of Defence letter no 1/1/72/D-6/684 dated 24 November 1975, roles of BN include keeping the SLOC open during war and at peace and keeping the sea ports of Bangladesh open for shipping during a war. BN is supporting port authority round the clock by deploying her ships to ensure security to ports and anchorages.

Bangladesh Coast Guard (BCG)

Most of the roles of BCG as assigned by the Coast Guard Act, 1994 (Act No. 26 of 1994 Dated 13 December 1994) are to prevent illegal immigration, pollution and piracy control etc. The secondary role is to assist BN during war.

Port Authorities and Department of Shipping (DOS)

The port authorities are responsible as the Designated Authority (DA) for the security monitoring of port facilities. On the other hand, the DOS is responsible as a focal point for the protection of the shipping from all source of threat.¹² This is coordinated by a committee headed by Director General (DG) of Shipping. The DA committee holds meeting every two months to appraise security situation. DA Committee consists of following members :

11. Captain A K M Shafiqullah, The Daily Star, Wednesday, March 20, 2013.

12. Interview of Commodore Mohammed Zakiur Rahman Bhuiyan, (L), BSP, psc, BN.

- a. DG, DOS - Chairman
- b. BN - Member
- c. BCG - Member
- d. DGFI - Member
- e. NSI - Member
- f. NBR (Customs) - Member
- g. CPA - Member
- h. MPA - Member
- j. Police- Member
- k. Mercantile Marine Department (MMD) - Member
- l. Ministry of Shipping (MOS) - Member

Merchant Marine

Merchant marine may contribute to the security by straight adherence of rules and regulations. They may also collect information and timely disseminate that information to ease the actions by the security forces.

Bangladesh Army

Bangladesh Army will be deployed in the ports as Key Point Installation (KPI). They will provide the physical security of the ports and cargo container terminals against airborne attack.

Bangladesh Police and Bangladesh Ansar

Bangladesh Police and Bangladesh Ansar are contributing to the security focused in peace time. They should support security agencies to safeguard the ports in peace and in crisis.

Bangladesh Fire Service and Civil Defence

Bangladesh Fire Service and Civil Defence is contributing by maintaining readiness to fight fire in case of any emergency.

Analysis of Vulnerabilities/ Threats of Ports

Traditional

Bangladesh maintains warm relation with all other countries of the world. Even though traditional threats those are likely to be faced by our ports and SLOCs are discussed below :

a. Blockade. During war, considering the shipping route and the advantageous location of the potential aggressors, distant blockade is more likely to our seaborne trade. It is understood that convoying is still the only workable naval solutions for Bangladesh against blockade.

b. Special Force Incursion. Special Forces may be sent to our ports for carrying out clandestine attack on various important installations.

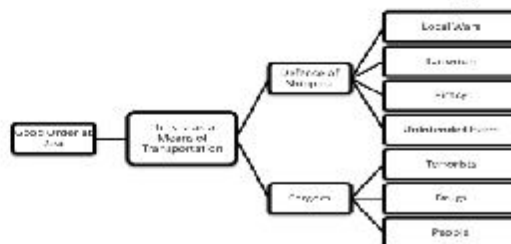
c. Seizure. Merchant ships plying to and from our port are subjected to seizure by the belligerent during tense or war situation. The strategic concept of air strike on the ships at the SLOC remains vulnerable of our overall maritime strategy.¹³

d. Mining. Mining the port jetties and also outside the harbour mouth may jeopardize the commercial activities of our country. Both Chittagong and Mongla ports are vulnerable to mining.

Non-Traditional

Non-traditional threats are mostly undertaken by the non-state actors. Good order at sea directly related with sea-borne transportations. Relation between good orders at sea with the non-traditional threats¹⁴ is shown in Figure1.

Figure 1. Threats to Good Order at Sea
(Source: G Till, "Seapower: a guide for the twenty-first century", 2nd edition, 2009)



13. G Till, Maritime Strategy and the Nuclear Age, London, Macmillan, 1982, , p. 155.

14. G Till, Seapower: A Guide for the Twenty-First Century, Naval Policy and History, 2nd edition, 2009, , p. 310.

Incidents in the sea area of Asia are reducing day by day. As per analysis of incidents reported by ReCAAP shows that enhancing monitoring system has decreased the overall number of incidents in Asia¹⁵ as is shown in Figure 2.

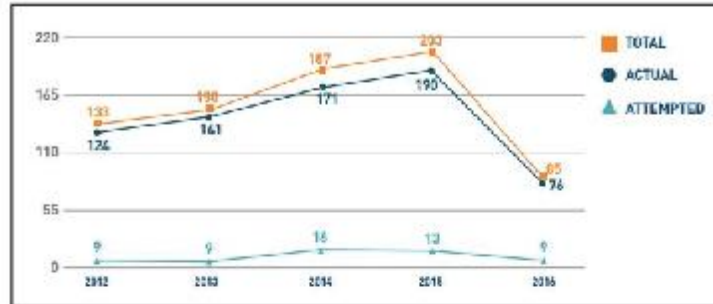


Figure 2 : Number of Incident in Asia Reported by ReCAAP in Last Five Years
(Source : Annual report on piracy and armed robbery against ships in Asia, 2016 by ReCAAP)

The non-traditional threats at present Bangladesh are facing at sea ports and SLOC are as follows :

a. Piracy. As per International Maritime Bureau's report on "Piracy and Armed Robbery against Ships" in the year 2014, there were total 21 incidents at Bangladesh¹⁶ which is shown in Figure 3. Again, as per same report in the year 2015, there were total 10 incidents at Bangladesh.¹⁷ It is the outcome of orchestrated efforts of all concerned. A comparison of incidents on board ships at anchor/berth in the year 2016¹⁸ is shown in Figure 4

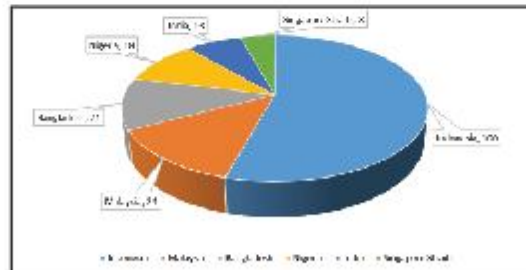


Figure 3 : Six Locations Recorded 75% Attacks from a Total of 245 Reported Attacks for the Period January 2010 to December 2014 (Source : International maritime bureau's report on "piracy and armed robbery against ships", 2014)

15. Annual Report on Piracy and Armed Robbery Against Ships in Asia, 2016, by ReCAAP, 2016, , P.9.

16. International Maritime Bureau's report on "Piracy and Armed Robbery against Ships", 2014

17. International Maritime Bureau's report on "Piracy and Armed Robbery against Ships", 2015, ,p.7.

18. Annual Report on Piracy and Armed Robbery Against Ships in Asia, 2016, by ReCAAP, 2016,, p.6.

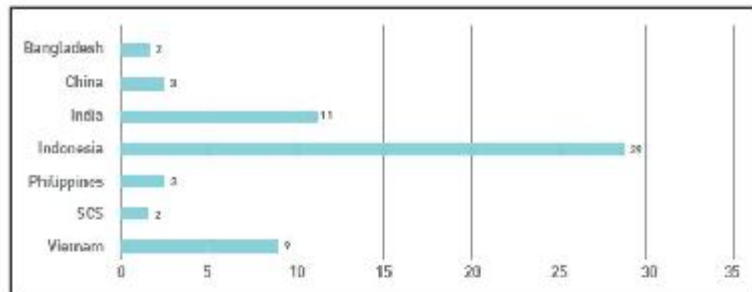


Figure 4 : Incidents on board ships at anchor/berth in the year 2016

(Source : Annual report on piracy and armed robbery against ships in Asia, 2016 by ReCAAP)

b. Terrorism. The government of Bangladesh is showing zero tolerance to suppress terrorism with all out effort. Vulnerabilities of sea ports to terrorism in Bangladesh are as follows :

- (1) Terrorist may infiltrate and carry out sabotage activities on the important installations of the sea ports.
- (2) Destruction of Jetty and ships at berth.
- (3) Use of commercial cargo containers to smuggle terrorists, nuclear, chemical or biological weapons, components thereof, or other dangerous materials etc.
- (4) Seize control of large commercial cargo ship and use it as a collision weapon for destroying installations located on the waterfront or sinking it at navigable channel.

c. Pollution. Coastal and marine water pollution in Indian Ocean region is mainly due to direct discharge from ships. Any sort of pollution may occur due to the accident in the maritime domain.

d. Climate Change. The impact of global warming on Bangladesh will be most significant in future.¹⁹ It is predicted that Bangladesh will lose 17.5 percent of the land by increasing height of ocean level by one meter. Adverse impacts of climate change will affect navigation safety of ships and damage to port facilities.²⁰

19. Colonel AHM Shahidullah, psc, "Environment and the Military Planning", Mirpur Paper, Issue No.5, April 1998,, P.111.

20. <https://www.google.com/search?q=Climate+Change+effect+on+port+security&ie=utf-8&oe=utf-8> retrieved on July 29, 2017.

Proposed Security Strategy for The Sea Ports and Sloc of Bangladesh

Overall Maritime Security Framework

The overall maritime security framework may involve all the maritime agencies. DG Shipping opined that overall security framework should be framed by taking all the stakeholders of the maritime arena under a unified command.²¹ Technology alone cannot secure ports and shipping. An integrated, carefully planned approach will incorporate the best elements of technical, physical, procedural and information security disciplines into proposed strategy.

Means and Ways to Address the Terrorism Threats to Sea Ports

- a.** A well-coordinated interaction between the law enforcing agencies and the military experts need to be established.
- b.** Security Forces need to be trained both at home and abroad. They must be proactive to face any sort of threat.
- c.** Modern equipment should be used to combat the increasing threats.
- d.** Awareness of general people needs to be increased through various electronic media and newspaper by projecting the heinous act of terrorists.

Proposed Peacetime Security Strategy

Proposed peacetime security strategy to keep the port and SLOC uninterrupted from non-traditional threats is as follows :

- a. Implementation of ISPS Code.** Implementation of ISPS code will certainly improve the overall security arrangement of ports and shipping.
- b. Integrated Maritime Governance.** A standing committee may be formed under DOS integrating all agencies (BN, BCG, Army, Police, Port Authority, Fire and Civil Defense, Bangladesh Shipping Corporation (BSC), Customs etc.) working directly or indirectly on maritime security, trade, transportation etc.

21. Interview of Commodore Mohammed Zakiur Rahman Bhuiyan, (L), BSP, psc, BN.

c. Physical Security of Port Infrastructures. For physical security of port infrastructures, number of modern technology based security systems can be adopted. For example virtual fence, smart yard management, intelligent digital video surveillance system, Virtual Security Shield (VSS) etc.

d. Foreign Investment. Investors from developed countries may be invited to invest as Foreign Direct Investment (FDI). This will enhance the conduct of joint transportation security.

e. Regional Cooperation. Regional cooperation may contribute to ensure port and SLOC protection :

(1) Information Sharing. On completion of the ongoing GMDSS project under DOS, Bangladesh would be more vigilant to monitor coastal area. Moreover, through GMDSS information may be shared with regional countries for better coastal surveillance.

(2) Regional Forum. Bangladesh took part in the regional forums like Indian Ocean Naval Symposium (IONS), Critical Maritime Routes in the Indian Ocean (CRIMARIO) etc. Bangladesh may continue to join such regional forums actively for the establishment of maritime situational awareness.

(3) Bilateral Security Arrangement. Bangladesh and the United States has discussed about regional cooperation and traditional and non-traditional security issues, including cooperation in countering terrorism during security dialogue on 07 October 2015.²²

Proposed War Time Security Strategy

During the war, main threat will be projected on our SLOCs to cripple the economy. Conventional threats can be negotiated by BN and BCG as appropriate to keep SLOC open. Side by side diplomatic effort may ease out the total security assurance. Proposed wartime security strategies to keep the port and SLOC uninterrupted from any threats are as follows :

22. 'Bangladesh, US to discuss security issues today', in Daily Sun, , October 07, 2015, <<http://www.daily-sun.com/post/74840/Bangladesh-US-to-discuss-security-issues-today>> retrieved on August 07, 2017.

a. Security and Military Strategy. Merchant ships are likely to be harassed by the adversaries. To counter that following steps may be taken :

(1) Security of Ships at Anchor. Constant security may be ensured for the ships which will remain at anchor by Coast Guard. Only authorized boats are to visit the merchant ships.

(2) Adoption of Threat Level. ISPS threat level may be increased according to the alert level. Established security measures may be complied strictly.

(3) Coastal Defence by Layered Defence. Layered defence concept may be adopted considering the threat axis placing BN and BCG ships at the outer layer. Subsequent layers will be formed as per coastal defence plan coordinated by BN. Existing shore based coastal defence of Bangladesh comprises with only one Coastal Defence Battery (CDB) at the entrance of CTG port. Therefore, capability of existing CDB must be enhanced and new CDBs are to be established in important locations along the coast.

b. Military Pact. Ties with regional and extra regional powers to protect the shipping may not be possible due to less interest of other party. However, Bangladesh may resolve this threat diplomatically by military pacts with regional countries for cooperative approach to maintain security of SLOC.

Challenges and Mitigation

Various challenges and their mitigations to port security of Bangladesh are as follows :

a. Challenges in Governances. Not ensuring higher priority of the sea ports along with full protection by ministries and agencies creates challenges to maritime good governance. By coordinated efforts between government and stake holders can overcome this hurdle.

b. Equipment. Sea ports of Bangladesh are lacking in modern security

equipment like modern patrol vessel, pollution control vessel etc. Therefore, immediate steps may be taken to procure this equipment as per priority.

c. Integrated Automation System. Bangladesh ports are still lacking behind in the integrated automation system. Steps may be taken to install reliable, proven and modern systems.

Conclusion

The economy of Bangladesh largely depends on the ports and SLOCs. More than 90% of her exports and imports are carried through the sea. We may not be able to run even for about a month if the SLOC is disrupted. So, it is of utmost importance to keep the port and SLOC secured from threats originated in peace and war. The peacetime security arrangements of the ports are working satisfactorily with number of limitations. We have to prepare in all curves for countering future threats and challenges.

There are scopes for security improvement considering the dependency of the whole country on the ports. Number of layers and measures can be implemented to protect the ports. Besides, the involvement of maritime agencies, security forces i.e. BN, BCG can play important role for port security. BN has been entrusted by our government with the role of protecting and keeping the ports and SLOCs open in peace and war.

In present day's context, it is not possible to ensure the security of the port with the involvement of single service or agency. To meet the excessive trade requirements new ports are joining in the list. Considering all the facets of port security, comprehensive plan, security strategy and integration of the maritime agencies may lead us to counter any possible threat at present and in future. There will be number of challenges for Bangladesh in framing and implementing any such strategy. But, considering the importance of the sea-borne trade and dependency for the economic survival, Bangladesh needs to improve her port and SLOC security arrangements for alleviating all challenges.

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4. Maritime Strategy and the Nuclear Age by Professor Geoffrey Till, 1982.
5. Seapower : A Guide for the Twenty-First Century by Professor Geoffrey Till, 2009.

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10. The Daily Star, article "Agro-economy of coastal Bangladesh" November 23, 2014.
11. Captain A K M Shafiqullah, The Daily Star, Wednesday, March 20, 2013.
12. Interview of Commodore Mohammed Zakiur Rahman Bhuiyan, (L), BSP, psc, BN, about 'Proposed Security Strategy for the Sea Ports and Sea Lines of Communication of Bangladesh'.

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13. <http://macademy.gov.bd/historical-background/> retrieved on August 02, 2017.
14. <http://cpa.gov.bd/> retrieved on 06 August 2017.
15. <http://www.mpa.gov.bd/> retrieved on July 31, 2017.
16. <https://www.google.com/search?q=Climate+Change+effect+on+port+security=utf-8&oe=utf-8> retrieved on July 29, 2017.

Biography of the Writer



Commander M Yousuf Alam, (L), psc, BN was born on 03 June 1979. He joined Bangladesh Navy on 29 December 1997 and was commissioned on 01 July 2000 from Electrical Branch. He obtained BSc Engineering degree in Electrical and Electronic Engineering from Khulna University of Engineering and Technology (KUET). He is an ex cadet of Comilla

Cadet College. The officer has got fine mixture of appointments. In his service career, he served in almost all kinds of ships in navy. He has served as instructor at BNA in 2006 and 2008. He was staff officer in Coast Guard Headquarters. He has completed several courses like Electrical specialization course from BNS SHAHEED MOAZZAM, Officer' Bomb and Improvised Explosive Device (IED) Disposal course from Bangladesh Army and Avionics Technology (AVT) course from Bangladesh Air Force. He is one of the pioneer Naval Aviation engineers. He is a type trained avionics engineer on Agusta Westland (AW109) helicopter from Italy. He also performed duties as staff officer in Sector Headquarters at UN mission in Ivory Coast. He is a graduate from Defence Services Command and Staff College (DSCSC), Mirpur. He also earned diploma from Turkish Joint Command and Staff College, Istanbul. Presently, he is appointed at Naval Headquarters, Directorate of Naval Aviation. He is married and blessed with one son.

SUSTAINABLE OCEAN MANAGEMENT TO MAXIMIZE THE BENEFIT OF BLUE ECONOMY

Commander Fahmida Mohsin, (L), BN

“The greatest threat to our planet is the belief that someone else will save it.”

– Robert Swan British Environmentalist

Introduction

As the world's largest ecosystem, oceans are essential to the very survival of humanity, from air we breathe to the food we eat, the goods we trade and the medicine we need. The rising importance of ocean based resources has resulted in the emergence of the term 'Blue Economy'¹. Once thought to be never ending, ocean resources are showing serious signs of decline on a global scale. However, as well as passing a growing threat to coastal and island communities, ocean themselves face a growing array of threats, including acidification, pollution and the degradation of biodiversity, deltas and estuaries.

Over the past 50 years the world's oceans have been subject to greater human pressure than at any time in the recorded history². This pressure has taken a considerable toll on the resilience and productivity of the marine environment. Collapsing fisheries, vanishing habitat and global pollution are threatening the marine ecosystem goods & services on which humanity depends for future generation. The rising demand for ocean resources in combination with technological advances, climate change, biodiversity and habitat loss has put ocean health at a tremendous risk. Increasing atmospheric carbon dioxide (CO₂) concentrations have resulted in ocean acidification rising by 26%, and oxygen levels in the oceans decreasing as a result of ocean warming and other factors such as coastal eutrophication³.

Urgent and concerted action on a global scale needs to be ramped up to ensuring necessary progress in improving the health of oceans and ocean services

1. Sakhuja Vijay and NarulaKapil, (2017), Perspectives on Blue Economy, Delhi, p 1.

2. Paulo A.L.D.Nunes, Lisa EmeliaSvensson and Anil Markandya, (2017), Handbook on the Economics and Management of Sustainable Oceans, Edward Elgar Publishing, Cheltenham, UK, p 33.

3. Paulo A.L.D.Nunes, Lisa EmeliaSvensson, Anil Markandya, (2017), op cit, p 1.

to offset the rapid decline. Challenges and opportunities related to oceans highlight the inextricable link between environmental, social and economic progress, and their essential role in delivering the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change. This includes not only goal specifically designed to preserve life below water, but also those for poverty alleviation, hunger and sustainable production and consumption. It is therefore crucial to develop capacity building for ocean governance.

Aim

The aim of this paper is to analyze the impact of human activities on marine environment and suggest measures for sustainable ocean management to enhance the benefit of blue economy.

Relation between Sustainable Management of Ocean and Concept of Blue Economy

The concept of blue economy is still at an evolving stage where there is yet to be any comprehensive definition. Gunter Pauli, in his book 'The Blue Economy : 10 years, 100 innovations, 100 million jobs' brought the blue economy concept into prominence. He defined blue economy as "improvement of human well-being and social equity, while significantly reducing environmental risks and ecological scarcities." Vijay Sakuja and Kapil Narula in their book 'Perspectives on Blue Economy' defined blue economy as "integration of ocean economy development with the principles of social inclusion, environmental sustainability and innovative dynamic business models". Interestingly, the blue economy addresses both, resource scarcity and waste disposal systemically that enhance human development in a holistic manner. The ecosystem approach helps to ensure that the physical environment, resources, and biodiversity are treated as intrinsically interconnected which underpin the concept and practice of blue economy.

Economic Value of Sea

According to the UN, the commercial value of various activities in the world's ocean is estimated to be between US \$ 3 trillion to US \$ 6 trillion and is

accrued from services and resources such as marine transportation, global communication (submarine cables), sources of food (fisheries & aquaculture feed 4.3 billion people), oil & gas (over 30% is produced from offshore), marine tourism (5% of global GDP & 6 to 7% of global employment) and shore based commercial activities (75% of mega cities in coastal area)⁴. Besides, the ocean provides pharmaceuticals and sea vegetation as food and emerging sources of energy such as tide waves, currents and offshore wind are increasingly tapped to enhance energy security.

Impacts of Human Activities on Marine Environment

Fisheries. Humans living near the coast have probably always used the ocean as a source of food. However, with advances in fishing equipment, larger ships and new tracking technologies, many fish stocks around the world have reduced significantly. Fish stocks on continental shelf areas are now widely considered to be fully or over exploited. Again, in the developing countries coastal or shallow waters are over exploited due to the lack of sufficient deep sea fishing gears. Aside from reducing fish stocks, unsustainable fishing practices can have other negative impacts on the marine environment. For example, some fishing techniques such as dredging and trawling can cause widespread damage to marine habitats and organisms living on the sea floor. These techniques also often capture non-target species (known as bycatch) that are then discarded.

Pollution. Our oceans have long been used as an intentional dumping ground for all sorts of waste including sewage, industrial run-off and chemicals. Some marine pollution may be accidental, for example, oil spills caused by tanker accidents. For example, oil spill that occurred on 09 December 2014 at the Shela River in Sundarban, Bangladesh, was an ecological catastrophe⁵. Some may be indirect, when pollutants from our communities flow out to sea via stormwater drains and rivers. Some effects may not be immediately obvious, for example, bioaccumulation - the process where levels of toxic chemicals in organisms increase as they eat each other at each successive trophic level in the

4. Paulo A.L.D.Nunes, Lisa EmeliaSvensson, Anil Markandya, (2017), op cit, p 21.

5. https://en.wikipedia.org/wiki/2014_Sundarbans_oil_spill accessed on 21 Aug 2017.

food web. All marine pollution has the potential to seriously damage marine habitats and life in the sea. Scientists are concerned that marine pollution places extra stress on organisms that are already threatened or endangered.

Eutrophication. It is caused by the release of excess nutrients into coastal areas via streams and rivers. These nutrients come from fertilizers used in intensive farming practices on land. Additional nutrients in the sea can lead to excessive phytoplankton growths that result in 'blooms'. When these large numbers of organisms die, the sharp increase in decomposition of the dead organisms by oxygen-using bacteria depletes oxygen levels. In some cases, this can result in the death by oxygen starvation of large numbers of other organisms such as fish. Due to the effect of eutrophication, algae blooms have created the World's largest dead zone in the Baltic sea⁶.

Introduced Species. Introduced species in our terrestrial ecosystems have contributed to a significant loss of biodiversity. It is not always easy to monitor or prevent the introduction of unwanted marine organisms, and visiting ships may introduce them accidentally on their hulls, in ballast water or on equipment. Not all introduced species will spread or even survive, but once established, they may be difficult or impossible to remove. For example, the Japanese seaweed, wakame *Undariapinnatifida*, which probably arrived in 1987, is now widespread⁷.

Ocean Acidification. Human activities have caused the amount of carbon dioxide in our atmosphere to rise dramatically. This impacts on the marine environment as the world's oceans currently absorb as much as one-third of all CO₂ emissions in our atmosphere. This absorption of CO₂ causes the pH to decrease, resulting in the seawater becoming more acidic. However, a relatively recent discovery is that even small changes in water pH can have big impacts on marine biology. Thus, ocean acidification has the potential to decrease marine biodiversity on a very large scale. Ocean acidification in Northeastern coast of

6. http://www.marbef.org/wiki/Case_studies_eutrophication accessed on 12 Aug 2017.

7. Te Kura, Toi Tangata, (2015), Human Impacts on Marine Environments, University of Waikato, Hamilton., (<https://www.sciencelearn.org.nz/resources/144-human-impacts-on-marine-environments> accessed on 17 Aug 2017)

US decreased the species like oysters, snails and coral because they cannot form their protective shells in highly acidic conditions⁸.

Concepts for Sustainable Ocean Management

Introduction of Marine Strategy Framework Directives. It focuses to achieve sustainable Management and good environmental status of the ocean. It is an action plan mainly aimed at the economic, social and environmental valorization of the national maritime space through the implementation of sectorial and cross sectorial projects, as well as already existing national strategy plans or those in preparation. EEU is following this strategy since 2008.

Implementation of Blue Growth Strategy. It is a long term strategy to support sustainable growth in the marine and maritime sectors. This strategy as a whole consider the predicted economic and population boom in the region which will pose increasing economic and social needs and also the available resources on the area. The strategy also signifies the use of emerging multidisciplinary methods towards blue economy in the region. There should be some way out to avoid the development error of the twentieth century.

Introducing Science to Action Approach. An in-depth analysis of the socio economics and governance of coastal and marine ecosystem of 17 marine managed areas in Belize, Ecuador, Fiji, and Panama over four years exemplifies how data can better inform actions, in what we call a science to action approach⁹. It indicates that collection of oceanic data through marine scientific research and other related data is a prerequisite for an effective policy making.

Rationale behind the Economic Benefits of Ocean and Coastal Systems in the Decision Making Process. It provides a compelling case that highlights the need to mainstream the value of ocean ecosystem services into human development and economic policies at various scale of decision making (local, regional, national and global). Finally, it provides the insight into improved ways to maintenance and enhance ecological qualities, environmental health and social well-being in the context of ocean ecosystem.

8. <https://www.livescience.com/27594-ocean-acidification-affects-us-coasts.html> accessed on 19 Aug 2017.

9. www.science2action.org and www.conservation.org.mmas accessed on 19 Aug 2017.

Marine Protected Areas. It should be established that it is sufficient in size and spatial distribution to assure that ocean services are sustainable in the face of increasing human impacts, environmental variability and ecological uncertainty. Recent professional assessments have suggested 20% of marine areas should be designated as marine protected areas¹⁰. In the Gulf of Kutch of India, 110 km² was declared as marine protected area to save the endangered wild life¹¹.

Operationalizing the Ecosystem Based Approach. This environmental management approach focuses on the range of benefits that we receive from marine system rather than on individual benefit¹². It integrates social and ecological concerns in ocean management, engaging multi-sectorial stakeholders, giving priority to cooperation and coordination, and adjusting to changes in circumstances.

Occasional Closing of Seas to Fishing. Occasional closing of seas to fishing may be beneficial for the rebuilding of fish biomass, increasing the quantity and increasing the resilience of fish stocks to climate change. Studies suggest that conservation of biodiversity is essential for sustainable functioning of the entire ocean¹³. Before doing it, an assessment must be made on how closure of seas will impact food security for the poorest and fish dependent communities. Closing of rivers and coastal areas for fishing during the breeding period of Hilsha fish increased the growth of Hilsha 8% to 10% every year¹⁴.

Application of Co-Management Fishing Regime. Successful application of a co-management fishing regime between the fishery communities and govt stakeholders, effectively improve resource management. Co-management fishing regime in Saruga Bay of Japan has successfully contributed in sustainable management of Sergestid shrimp.

10. R. Costanza et al,(1999), Ecological Economics and Sustainable Governance of the Ocean, Sereis 31, p 174.

11. https://en.wikipedia.org/wiki/Marine_National_Park,_Gulf_of_Kutch accessed on 12 Aug 2017.

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13. Danovaro, R. (2008), Exponential Decline of Deep-sea Ecosystem Functioning Linked to Benthic Biodiversity Loss, pp. 1-8.

14. The Daily ProthomAlo, (2015), Bangladesh a World Model for Hilsa Production, 20 October.

Socio-economic Impacts of Marine Litter and Cost of Policy Inaction.

Marine litter degrades the environment highly and it may cause decline of tourism¹⁵. It can also lead to loss of value in the sales of certain types of sea food and fish. The loss of marketable lobster owing to mortality caused by abandoned or lost fishing gear is estimated to lead to a global loss of US \$250 million per year¹⁶.

Monitoring the Effects of Taxes and Subsidies on Sustainable Ocean Management. The contrast between the two fiscal instrument is so great that they could be described as ‘the minnow’ (taxes) and ‘the whale’ (subsidies). Fishing subsidies generally leads to over exploitation of ocean resources. So, it is important to distinguish between harmful subsidies and beneficial or ‘good’ subsidies that could help sustainable management of oceanic resources. Bangladesh government provided 224,000 hilsa fishermen a three-month access to social security during the fishing ban period¹⁷. It had a significant effect in conservation of Jatka (small Hilsa) fish.

Adaptation of Strategy for Ocean Acidification. Only a small handful of studies have attempted to estimate the potential social and economic impacts of ocean acidification¹⁸. It affects a range of physiological process including behavior, growth rates and reproduction in many species. To con the ocean acidification there are win-win options that need to be exploited. In particular any kind of action that improves marine ecosystem health, resilience or biodiversity could delay and reduce adverse effects of ocean acidification.

Tackling Marine Plastic Pollution. Many initiatives have evolved at local, national, regional and global levels, showing that sustainable solutions for reducing marine plastic pollution need to encompass a mix of voluntary and legally binding exercises. It needs to involve different stakeholders from the

15. ManfredWalser, Christian Neumann, (2008), *The Value of Our Ocean: The Economic Benefits of Marine Biodiversity and Healthy Ecosystems*, Published by WWF, Frankfurt, p 10.

16. Paulo A.L.D.Nunes, Lisa EmeliaSvensson, Anil Markandya, (2017), op cit, p 43.

17. Ibid, *The Daily ProthomAlo*, (2015).

18. Cooley, S.R., Lucey, N., Kite-Powell, H. and Doney, S.C., (2011), *Nutrition and Income from Molluscs Today Imply Vulnerability to Ocean Acidification Tomorrow*, Duke University press, North Carolina, p 15.

plastic and waste management sectors, tourism and fishing industries, the research community, non-governmental org, local authority and national govt.

Use of UN Regulations for Policy Making. The stand-alone SDG on ocean sustainability has the possibility to give an injection to effective integrated global governance. UNCLOS is playing a vital role in facilitating better governance for ocean research and management for a safer, more equitable, cleaner, and more prosperous ocean for all. Countries should make policies to take maximum benefit of these UN initiatives for sustainable ocean management.

Private Governance in Ocean Management. Industry and civil society actors are becoming increasingly active in ocean governance. Private governance can potentially complement state governance, particularly where public institutions are weak. For example, sustainability certification by private organizations is observed as a market-based governance arrangement. This certification incorporates the setting of standards for ecological and social interactions and the auditing systems that measure compliance against these standards. Some of the institutions are Marine Stewardship Council (MSC) for fisheries, the Aquaculture Stewardship Council (ASC) for aquaculture, and Blue Flag certification for beach and marina tourism¹⁹. However, at the same time private governance initiative alone cannot attain policy objectives in what is essentially an open-access or common-property resource.

Utilization of Global Environment Facility (GEF). As the largest financial institution with the ability and experience to confront the challenges facing shared marine and coastal ecosystem, the GEF is committed to ensuring the long term sustainability of the oceans. It has allocated a total of \$ 1.14 billion in project grants²⁰. Weaker nations should utilize this facility for management of ocean.

19. https://www.researchgate.net/publication/316887651_Private_governance_of_ocean_resources [accessed Aug 21, 2017].

20. Paulo A.L.D.Nunes, Lisa EmeliaSvensson, Anil Markandya, (2017), op cit, p 21.

Regional Ocean Governance. It is found very effective for the protection of ocean environment and its biodiversity. It has been taking place through :

- a. Regional Seas Program, many of them supported by UN.
- b. Regional Fishery Bodies, some establish under the framework of FAO.
- c. Large Marine Ecosystem Mechanism, including project supported by GEF.

Ocean Literate Citizen. Ocean literacy relates to more established concepts such as scientific literacy and environmental literacy. Education and communication have a key role to play in fostering our appreciation of the importance of oceans, our understanding of own responsibility in their destruction and our awareness of the relevance of their protection.

Protection of Marine Environment from Land Based Activities.

In November 1995, over 108 govt laid down their commitment to protect and preserve the marine environment from the impacts of land-based activities. The commitment was made under the auspices of Global Program of Action (GPA). It was very successful to deal with land based impacts upon marine environments, specifically resulting from sewage, persistent organic pollutants, radioactive substances, heavy metals, oils, nutrients, sediment mobilization, litter, and physical alteration and destruction of habitat.

Criteria for a sustainable Ocean Management Policy

The following questions should be answered in the interpretation and application of the sustainable ocean management policy :

- a. Have the full costs and benefits (including social and ecological) been identified ?
- b. Are individual incentives aligned with social and ecological goals ?
- c. Have all of the actors been identified to whom these costs and benefits accrue ?

- d.** Have all of the stakeholders been engaged in decisions ?
- e.** Are the costs fairly reflected in the prices, charges, and levies paid by beneficiaries ?
- f.** Does the decision-making process adequately internalize costs and benefits ?
- g.** Have the major sources of uncertainty (ecological, social, and economic) been identified ?
- h.** Has a process been established to monitor new information periodically, and to use that information to revise the course of action ?

Challenges for Sustainable Management of Ocean

Challenges for sustainable ocean management can be divided into four broad categories. These are :

- a.** Economic efficiency, where the marginal social cost has to be equal or less than the marginal social benefit, over time & space.
- b.** Social effects of the marine management has to be acceptable & affordable by different social groups (social equity), intra & inter-generationally.
- c.** Environmental & ecological effects of activities under consideration have to be sustainable over time & space (ecosystem resilience).
- d.** Intergovernmental cooperation is required but the problem is complex and solutions fragmented in the case of ocean. To combat climate change there is one main convention but when it comes to regulating the oceans there are over 567 agreements relating to their governance²¹. A global ocean governance framework is therefore crucial.

21. Paulo A.L.D.Nunes, Lisa EmeliaSvensson, Anil Markandya, (2017), op cit, p 33.

Conclusion

The world's oceans and coastal ecosystems provide critical services – food security, livelihoods and coastal protection for billions of people. Ocean resources, if managed sustainably, can be a major contributor to securing food safety and energy needs. The significant contribution of oceans to the three dimensions of sustainable development (economic, social and environmental) was not given the attention it deserved. However, inclusion of goal 14 in SDG framework is recognition of the vital importance of healthy oceans to sustaining life livelihoods on Earth. It is not just a coastal state or small island developing state issue – we all stand to benefit from healthy, productive and resilient oceans and seas.

Today, there is little doubt that the world faces great challenges to sustain the health of its ocean and, as a consequence, the usage of marine resources. Adverse changes are taking place at an extraordinary rate, relative to those seen over millions of years. The oceans and marine biodiversity are increasingly negatively affected by marine pollution of many kinds like plastic, persistent organic pollutants, heavy metals and nitrogen based compounds from marine and land based resources. This adds to the already negative trends, such as unsustainable fishing practice much of which is illegal, unreported and unregulated, global warming, and degradation of coral reefs, mangrove forests and related ecosystems that are a primary source of food and income for communities.

One of the fundamental barriers to restoring ocean health is the lack of coherent global governance, including weak compliance and lack of enforcement. The ocean governance approach must ensure integration in key areas, such as sustainable aquaculture, fisheries reform, combating marine pollution, conserving critical habitat and species, and engaging in integrated ecosystem based management. Through this we can provide attractive blue economic opportunities while also improving sustainable management practices and governance in vulnerable coastal communities. Although we are starting to see national and regional maritime spatial planning and integrated coastal

management, crucial works still lies ahead. Simultaneously, human activities on land and in the oceans are causing rapid deterioration in the marine environment. It is crucial to address successfully the link between land and sea activities. This paper recognizes that problems and solutions vary across the world's oceans and consequently a 'one size fits all' approach is unlikely to work. It is important to have a system that can adapt to rapid technological development and engage with science-policy mechanism.

Biography of the Writer



Commander Fahmida Mohsin, (L), BN was commissioned in the Electrical Branch of Bangladesh Navy on 21 December 2001. She is a graduate in Electrical and Electronics Engineering from Bangladesh University of Engineering and Technology (BUET). She did her Electrical Engineering Specialization Course at Electrical School BNS SHAHEED MOAZZAM, Kaptai. She completed PCB Repair and maintenance Course from India. She also completed EW Managers Course from HMS COLLINGWOOD, UK. Cdr Fahmida has served as Radio Instrument Officer and OIC Calibration Center in BN Dockyard. Presently, she is serving as Staff Officer (Information Technology) at Naval Headquarters. In personal life she is married to Commander M Razibul Islam and blessed with twins, one son and one daughter.

MARITIME INTERAGENCY CO-OPERATION AND OPTIONS FOR BANGLADESH NAVY

Lt Commander M Kamrul Ahsan, (X), (H3), BNVR

“The only thing that will redeem mankind is cooperation.”

- Bertrand Russell

Introduction

Without cooperation none can reach to a definite mission. Maritime power is the ability to use the sea which can bring benefits to a state in economic terms through trade and resource exploitation and in military terms through the protection of the economic elements as well as the projection or threat of force against opponents. Maritime power is the total sum of several constituent capabilities like naval forces including the shore bases, strength of merchant fleet, the quality of ports and harbors, shipbuilding and ship repair installations, the productivity of fishing fleet and technological and hydrological capacity to exploit the resources to be found in the economic zone. Geographical location is also a vital component for a country to become a maritime power.

For achieving the sea control, Navy plays the vital role for any country for national interest. Number of maritime agencies also contributes to raise the economic strength of any country. In Bangladesh, Navy and maritime agencies are working proactively to serve the purpose of Bangladesh rather for national interest. Many factors affect the flow of this purpose. The vital influencing factor which is really accelerating the process is the maritime interagency cooperation with Bangladesh Navy.

More than 91 percent of the nation's trade is conducted through sea. In total the sea has made us dependant on her for many issues like Trade and Commerce, Fisheries, Off-shore Resources, etc. But the frequent encroachments of fishing resources by foreign bodies, illegal trafficking of arms, drug, sea robbery and many similar illicit activities have exposed the maritime water of Bangladesh to varieties of threats both conventional and unconventional in nature. The activities of the state maritime agencies like the navy, the coastguard,

the port authorities, Director General of Shipping (DG Shipping), BIWTA, Shipping agencies, etc indicate that directly or indirectly the concept of maritime security is already existing. But for optimum output the unconventional aspects of maritime security needs further specification and appropriate attention.

Maritime interagency and Bangladesh Navy's joint cooperative steps may play the vital role during war and peacetime. We need to focus and train ourselves to achieve the better outcome in terms of naval supremacy over the territorial water and high seas.

Aim

The aim of this paper is to analyze about the maritime interagency co-operation and options for Bangladesh Navy in war and peacetime. The paper will highlight the recommendations in respect of interagency co-operation and how Bangladesh Navy may achieve maritime strategic advantages over Bay of Bengal.

Maritime Security and Bangladesh

Maritime Security

The concept of maritime security is as old as the use of the oceans, with nations devising their own customs and practices to safeguard their multifarious marine related interests in the seas and oceans. Maritime security implies those measures employed by owners, operators and administrators of vessels, port facilities, offshore installations and other marine organizations or establishments to protect against seizure, sabotage, piracy, annoyance or surprise.

Threats and Vulnerabilities to the Maritime Sector

Nature of Threats

Threat to developing countries primarily looms from the neighbors. Today, the threats in the maritime sector are expected both from state and non-state actors. It speaks that our maritime interests are vulnerable to both conventional and unconventional threats. The unconventional threats are generally peacetime

threat. Those may not be regular in nature but can significantly affect the maritime security of any nation.

Concept of Maritime Agencies Cooperation

Considering the previous and existing maritime threats it is mandatory to run their activities of all maritime agencies in a coordinated paced footing. The concept of maritime agencies is used effectively by USA, UK and other developed country keeping in mind to get maximum advantage in country's national interest. To blend the maritime interagency cooperation with Bangladesh Navy first of all we have to possess clear concept about the charter of duties and responsibilities of those agencies. Considering those charters of duties, Bangladesh Navy may adopt the tactics to achieve maritime benefits out of all existing maritime agencies cooperation during peacetime or in wartime scenario.

Existing Government Maritime Agencies of Bangladesh

The maritime agencies of Bangladesh consist of the regulating bodies (Ministries), the military and constabulary services, public sector commercial operators, private sector commercial operators, ports and harbours, construction, repair and maintenance organization, maritime institution for education, technology and research and hydrographic and meteorological services. Functions of the above agencies have been discussed here.

Ministries

The ministry dealing with maritime and related sectors is the Ministry of Shipping. The functions of the organizations under this ministry are discussed below :

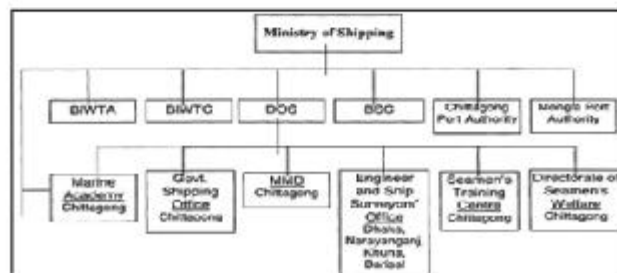


Figure : 1

a. Director General of Shipping (DG Shipping). Department of Shipping (DOS) is the main regulatory body for international shipping. It deals with certification of seagoing vessels, training certification of seaman, organization and control of institutions through its offices of Principal Officer Mercantile Marine Department (POMMD) at Chittagong and Khulna.

b. Bangladesh Inland Water Transport Authority (BIWTA). BIWTA deals with certification of inland water vessels, manages inland water, and trains her pilots for inland navigation. It also maintains navigational routes and river ports, major ferry/launch ghats throughout the country and a training centre.

c. Port Authorities (Chittagong Port, Mongla Port and Payra Port). These are autonomous authorities. In general, they are responsible for smooth functioning of their respective ports so that ships can enter, leave harbour, load and unload their goods safely and efficiently.

(1) Chittagong Port. The Chittagong Port Authority (CPA) runs Chittagong Port and operates other services within its jurisdiction of up to 8.5 nautical miles seaward.

(2) Mongla Port. The Mongla Port Authority (MPA) runs Mongla Port and operates other services within its 8 moorings, 21 anchor berths and 5 jetties. She has to maintain her long 67 nautical miles navigational channel round the year through extensive dredging.

(3) Payra Port. The port of payra is a small sea port in southern Bangladesh.

Associated Ministries. The other associated ministries are :

- a.** Ministry of Energy, Petroleum and Mineral Resources.
- b.** Ministry of Fisheries and livestock.
- c.** Ministry of Forest and Environment.

- d. Ministry of Defense.
- e. Ministry of Home Affairs.
- f. Ministry of Finance.
- g. Ministry of Industries.

Military and Constabulary Services

The military and constabulary services are authorized to enforce government laws, acts, ordinance and rules in the maritime area that belongs to Bangladesh. These services are Bangladesh Navy, Bangladesh Coastguard etc.

Bangladesh Navy. Bangladesh government declared the limits of the sea areas (Base line, Territorial water, EEZ etc) in 1974 through the 'Territorial water and Maritime Zones act 1974'. Next year in 25 Nov 1975, the MOD assigned Bangladesh Navy with specific roles and a series of constabulary tasks which generally includes patrolling sea areas to prevent piracy, drug trafficking, gunrunning, pollution, smuggling, illegal fishing etc. Though the Coast Guard has been established, but it is not yet effective to take over the whole range of these constabulary tasks at sea over the wide range of EEZ due to lack of adequate ships/craft and personnel. As such, BN will have to continue with these tasks even in the foreseeable future. Presently, BN has 105 ships and craft, and approximately of 22,000 personnel (1500 Officers).

Bangladesh Coast Guard (BCG). BCG has been established in 1994, however, is still in its formative stage. The duties and responsibilities of BCG have been notified by a Gazette in the Coast Guard Act 1994. The primary roles of BCG are fishery protection, anti piracy, anti smuggling, anti narcotics, disaster relief, search and rescue, anti gun running and port security and such other matters. Presently, BCG consists of very few vessels and boats, and a total of approximately 3,339 personnel only. Bangladesh Coast Guard is a Para-military as a component of Ministry of Defense, under which BCG will also operate during times of war and under declaration by the Honorable President.

Bangladesh has approximately 1,18,813 sq kilometers of Exclusive Economic Zone and 710 kilometers of shore line. Securing such a huge sea area and coast is a difficult and critical task. Moreover, BCG has been given the mandate by the government to perform this very important task. Accordingly, role of BCG has been outlined in its act known as “Coast Guard Act 1994” which are :

- a. Protection of national interests in maritime zones of Bangladesh.
- b. Prevention of illegal fishing in maritime area of Bangladesh.
- c. Prevention of illegal entering or leaving of foreign boats in Bangladesh through her maritime zones.
- d. Enforcement of any warrant or court order in respect of any ships within territorial waters of Bangladesh or of any person onboard such ship.
- e. Pollution control measures in maritime zones of Bangladesh.
- f. Ensure security of persons working in maritime zones of Bangladesh.
- g. Prevention of the handing over and smuggling of drugs.
- h. Participation in SAR and salvage operations.
- j. Security of the sea ports.
- k. Rendering assistance to BN in times of war.
- l. Assist Government in Disaster Management, especially in post crisis response in remote coastal areas.

Customs (Sea). There are three custom houses, one each, at Chittagong, Mongla (Khulna) and Patuakhali. They are to ensure that goods are imported or exported as per bill of entry and bill of export. No ships are allowed to enter or leave harbour without their approval. They also ensure that illegal items/personnel cannot enter or leave Bangladesh. Their boats are not suitable for plying at the outer anchorage. As such they are mostly assisted by naval ships and craft to perform their duties.

Public Sector Commercial Operators

The Government runs a large number of sea transport business in Bangladesh. There are also a few riverine transport owned by government in the inland waterways where the private sectors dominate.

Bangladesh Shipping Corporation (BSC)

BSC is a government corporate organization of 13 oceans going ships. BSC provides inter-ministerial chartering service for transportation of food grains and crude oil at Chittagong and Mongla.

Bangladesh Inland Water Transport Corporation (BIWTC)

BIWTC is a government corporate body owning 256 vessels. BIWTC has been obliged by the government to operate passenger and cargo vessel in the coastal areas despite huge losses. She also renders invaluable service in support of relief operation during flood and other natural calamities.

Bangladesh Fisheries Development Corporation (BFDC)

BFDC is a government corporate body started functioning in 1972 with 10 fishing trawlers gifted by the erstwhile Union of Soviet Socialist Republic (USSR). After the Soviets left in 1975, those trawlers were auctioned due to non-availability of trained crew. It now operates 10 trawlers, which remain close to the coast for fishing due to their short endurance.

Private Sector Commercial Operators

Information gathered on private sector operators are not very authentic. However, Ocean Cargo Liner, Inland Water Transport vessels, Fishing Trawler, Mechanized Country Boats are the Private Sector Commercial Operators.

Construction, Repair and Maintenance Organization :

- a. Khulna Shipyard (KSY).
- b. Chittagong Dry Dock Ltd (CDDL).
- c. Dockyard Engineering Works Ltd (DEW).
- d. Ship Breaking Yard.

Maritime Institutions for Education, Training and Research

Maritime institutions for education, training and research in Bangladesh are government owned. Due to lack of financial prospect, private institutes are yet to be established.

Educational Institutions. There are four educational institutions offering education in maritime subjects as under :

- a. Bangladesh University of Engineering and Technology (BUET) Dhaka.** BUET offers four-year graduation and one-year post graduation in Naval Architecture and Marine Engineering.
- b. Chittagong University (CU).** CU offers one-year post graduate in Marine Science (Biology).
- c. Bangladesh Agriculture University (BAU).** BAU in Mymensingh offers four-year post gradation programmers in fisheries.
- d. Khulna University of Science and Technology (KUST).** KUST offers graduation in marine science.

Professional Academies/Institutes. There are six professional training academics and institutes. These are :

- a. Bangladesh Naval Academy (BNA).**
- b. Bangladesh Marine Academy.**
- c. Marine Fisheries Academy.**
- d. Seamen's Training Centre (STC).**
- e. Deck Personal Training Centre.**
- f. Bangladesh Institute of Marine Technology (BIMT).**

Meteorological Service and Hydrography

In Bangladesh the Ministry of Defense (MOD) provides weather data through Bangladesh Metrological Department and Space Research and Remote

Sensing Organization (SPARRSO). The Department of Hydrography normally carries out hydrological surveys and updates navigational charts.

Bangladesh Navy Hydrographic and Oceanographic Centre (BNHOC)

BN has a modern Hydrographic and Oceanographic Centre named BNHOC, which is enriched with following capabilities :

- a. Production and distribution of nautical charts for the coastal area of Bangladesh.
- b. Tidal prediction and analysis of the coastal belt of Bangladesh.
- c. Maintain database for hydrographic, cartographic and tidal data.
- d. Procurement and distribution of nautical charts & publication for the international route.
- e. Issue Notices to Mariners as and when required for the coastal area of Bangladesh.
- f. Monitoring the survey activities and provide necessary assistance to BN survey ships.

Other Public and Private Sector Facilities

BIWTC Dockyards. BIWTC owns four small dockyards and one floating dock in Narayangonj and Barisal for maintenance of its small vessels.

CPA Slipway. CPA has a Slipway at Sadarghat, Chittagong.

BN Facilities. BN has its own maintenance and repair facilities at Chittagong and hardly seeks outside assistance for its ships and craft.

Private Sector Facilities. There are nine major private sector yards with limited capacity for design, construction, repair and maintenance of maximum 500 DWT vessels. Those are located in Dhaka, Narayangonj, Barisal, Khulna and Chittagong.

Minor Sea Ports/ River Ports

Apart from the three seaports of Bangladesh, there are a few minor seaports unsuitable for navigation by large vessels due to silting up and strong current. Some of the important minor seaports are Cox's Bazar, Moheskhali, Kutubadia, Hatia and Sandwip.

Some of the inland water ports are Dhaka, Narayangonj, Chandpur, Barisal, Khulna, Patuakhali, Beghabari, Narshingdi, Aricha/Paturia, Nagarbari and Daulatdia. Those are served by BIWTA, which also maintains five major ferry stations at Aricha, Paturia, Daulatdia, Nagarbari, Mawa and Char Janazat.

Nou Police. Recently, Bangladesh Police inaugurated "Nou Police" to prevent criminal activities in the coastal area beside Coastguard under Penal Code of Bangladesh. The organization is going to be a very essential maritime security agency for Bangladesh.

Role of DGFI & RAB in Maritime Aspects. From earlier DGFI is directly or indirectly rendering a great support to the maritime agencies like BCG, Navy, RAB, BGB to perform their duties effectively. Few battalions of RAB presently having limited maritime movement capabilities to prevent criminal activities near the coastal area. Now a days, these organizations/agencies have become the representatives of maritime agency.

Maritime Interagency Co-Operation and Options for BN

In modern time maritime interagency cooperation is having vast arena to describe which contain a greater effect in maritime sector and interests of Bangladesh and for Bangladesh Navy as well. For the collaborated effort BN may achieve huge advantage during war time and peace time.

Director General of Shipping (DG Shipping)

Department of Shipping (DOS) is the main regulatory body for international shipping. It deals with certification of seagoing vessels, training certification of seaman, organization and control of institutions through its offices of Principal Officer Mercantile Marine Department (POMMD) at

Chittagong and Khulna. DOS may help BN by rendering sea going vessel for effective sea lifting and carrying cargo during war or emergencies. It may provide BN to use for shadowing the naval convoy to achieve surprise for enemy forces during war or short of war. Their cooperation also can be used during peace time to carry out exercises.

Bangladesh Inland Water Transport Authority (BIWTA)

BIWTA deals with certification of inland water vessels, manages inland water, and trains her pilots for inland navigation. It also maintains navigational routes and river ports, major ferry/launch ghats throughout the country and a training centre. BIWTA may render support providing pilots to BN ships for effective navigational advantage in the coastal water during war or during peace for carrying out routine patrolling duties.

Port Authorities (Chittagong Port, Mongla Port and Payra Port)

These are autonomous authorities. In general, they are responsible for smooth functioning of their respective ports so that ships can enter, leave harbour, load and unload their goods safely and efficiently. Port authority may cooperate to BN for berthing facilities. For long time port authority is rendering their cooperation to BN for carrying out various exercises with them. Naval officers are also deployed at port to render help for effective port management.

Bangladesh Coast Guard (BCG)

BCG is under Ministry of Home Affairs. Their role is to maintain the Law and Order situation in the coastal areas. BCG always renders support to BN during war and peace. SAR (Search and Rescue) responsibility is vested to Coast Guard in most of the countries. Although Bangladesh is a signatory to Safety of Life at Sea (SOLAS) convention but she could achieve the capability to implement SAR jobs effectively. BCG and Anti Smuggling Cell of BN which is directly under command of Commodore Commanding BN Flotilla jointly can operate against smuggling, piracy, illegal arms and human trafficking etc.

Bangladesh Customs

Many a times BN carryout the boarding operations at the outer anchorages of Bangladesh. Bangladesh Customs may provide their officers to carryout search and seizure operations on merchant ship which may carry the threatening cargoes in their possession. On the other hand, customs also provide their assistance to release the arms and ammunition export import for BN or the sister services.

Bangladesh Shipping Corporation

Bangladesh shipping corporation is having 13 merchant vessel in their fleet. BSC may cooperate BN for carrying the Naval cargo in need of crisis. They may render the support to carry BN cargoes for relief operation and UN Peace Keeping missions. Navy officers may onboard on the merchant ships for NCS (Naval Control of Shipping) during war or peace depending on the necessary situation. The NCS organization chart is given in the ANNEXA.

Bangladesh Inland Water Transport Corporation (BIWTC)

BIWTC is in possession of a great number of passenger liners. BN may avail the transportation facilities of BIWTC in short of war situation or in crisis to transport troops, arms and ammo etc.

Bangladesh Fisheries Development Corporation (BFDC)

BFDC is a government corporate body started functioning in 1972 with 10 fishing trawlers gifted by the erstwhile Union of Soviet Socialist Republic (USSR). After the Soviets left in 1975, those trawlers were auctioned due to non-availability of trained crew. It now operates 10 trawlers, which remain close to the coast for fishing due to their short endurance. BFDC financed BN to procure BNS MEGHNA and BNS JAMUNA to contribute in the ground of fishery protection.

Various Maritime Institutes

Various maritime institutes may provide trainings to naval personnel which will be very advantageous to meet up various issues of BN

capabilities. Personnel may be trained on naval engineering, naval architecture, naval/marine subjects and on maritime security.

Role in Security Aspects

Redistribution of Responsibility. Bangladesh Navy and Coast Guard are the two maritime security agencies of Bangladesh. Their areas of responsibility and nature of operations are clearly defined like many other developed nations. Though navy is performing the constabulary duties at sea but in course of time this job is supposed to be taken over by coast guard. Now question arises, is Bangladesh capable to develop and maintain a coast guard of that level from where it can operate at deep sea? It may be mentioned that in last 10 years the development of coast guard was quite slow. Moreover, patrolling the same area (the EEZ) by navy and coast guard may be a duplication of effort and will require a large amount of infrastructural development for coast guard. At present, it seems that for coast guard it is more important to expand the activities in the coastal area for providing security to the maritime activities of the coastal people. On the other hand, navy can continue with the constabulary duties in the deep sea. To be more specific the responsibility of coast guard may be limited up to the CZ, whereas navy will be responsible for taking care of the constabulary duties beyond seaward limit of the CZ, as it is doing now. Giving priority to the area of responsibility both the organizations should be equipped to meet the forthcoming challenges.

Bangladesh Navy. To encounter the unconventional threats navy is mainly related with the constabulary duties at sea. With limited assets she is carrying out this duties but it is pretty difficult to ensure effective surveillance in the vast EEZ. The addition of Maritime Patrol Aircraft (MPA) and ship borne helicopter will allow navy to effect appropriate surveillance in EEZ and thus to encounter the crimes at sea. The establishment of shore based surface surveillance radars in the coastal areas will act as a force multiplier in encountering sea-borne crimes.

Coast Guard. The Coast Guard should be equipped with smaller but speedy and seaworthy vessels to enforce constabulary laws more effectively up to the seaward limit of CZ. The nation needs to put more attention to establish Coast Guard Stations in the coastal area on urgent basis. At present, the Coast Guard Stations are limited in Chittagong, Khulna and Barisal only.

Formation of National Committee for Maritime Security

Formation of Committee. A national level committee may be formed with the following members :

- a. The Minister, Ministry of Shipping (Chairman).
- b. Secretary, Ministry of Shipping.
- c. Inspector General of Police.
- d. Assistant Chief of the Naval Staff (Operations).
- e. Member Customs, NBR.
- f. DG, Coast Guard.
- g. Chairman, BIWTA .
- h. Chairman, BIWTC.
- j. Joint Secretary, Ministry of Home Affairs.
- k. Joint Secretary, Ministry of Environment and Forestry.
- l. Joint Secretary, Ministry of Livestock and Fisheries.
- m. Chairman CPA.
- n. Chairman MPA.
- p. Chairman BFDC.
- q. Managing Director BSC.
- r. DG Shipping (Member Secretary)

BN is already decorated with a limited maritime coordination cell which becomes proactive during EX SEA THUNDER of BN. But it needs to be more organized and effective to ensure and to focus on the importance of maritime agencies cooperation with BN.

Maritime Safety

Maintenance of law and order to ensure maritime safety is the responsibility of BN, BCG and Bangladesh Police. However, the responsibility of offshore platforms remains with the owner. Due to recent increase in marine traffic, fishing and offshore exploitation the existing tasks have been increased significantly. The increased volumes of task also include fire fighting, casualty evacuation, imparting of training, preventive measures against collision and inspection of safety measures by ships and craft. Without the interagency cooperation the aim will not be achieved.

Fishery & Resources Protection

Living Resources (Fish). Exclusive Economic Zone (EEZ) of Bangladesh is rich in fish stocks which are spreaded over our four major fishing grounds distributed reasonably close to the coast. Marine fisheries contribute about 22 percent of the country's total fish production. There are about 13 lac commercial fishermen of which a few lac are involved in marine fishing. Fish provides about 63 percent of the annual protein intake of the people and fisheries provide about 7 percent of the total work force earning from Tk 150 crores to Tk 2033 crores yearly for last 20 years. It contributes 6.15 percent to the GDP of the country and 6.28 percent to foreign exchange earnings. However, indiscriminate fishing needs to be checked through implementation of appropriate fishery legislation. BN, BCG, Marine Fishery officer, Magistrates from DC Office and Media jointly may achieve the success for fishery protection.

Anti Piracy- Robbery Operation

The reported piracy cases in Bangladesh waters are mostly of petty thefts of hawsers (ropes), paint buckets and personal belonging of crew. BN, BCG and Port authority may jointly achieve success in this aspect.

Preventing Illegal Arms Trafficking

Gun running is a very lucrative job for smugglers and they often try it no sooner the situation favours them. There had been many cases of gun running through sea in Bangladesh. The largest ever arms haul took place on 02 Apr 2004 from two small vessels at the Chittagong Urea Fertilizer Limited Jetty when a consignment of 10000 arms, 2000 grenades and 300000 bullets were seized. Curbing of Gun running requires purpose-built craft, accurate intelligence gathering and dedicated training. The maritime agencies like Port Authority, Customs, BD Army, BN and Police jointly may achieve great success in this aspect.

Preventing Illegal Drug & Human Trafficking

Bangladesh's close proximity to the Golden Triangle, the Golden Wedge and Golden Crescent make it a suitable transit area for drug smuggling. Land borders are being constantly and effectively guarded, as such the traffickers find sea route a better choice. Guarding of 710 kms long seacoast requires a lot of resources and training of personnel. Beside this, few brokers are involved for human trafficking in Malaysia, Myanmar and other countries. Concerned maritime agencies may take the required step to prevent those from informing BN.

Coordination Problems

The extent of interdependence among the nations within the region has deepened and the various states continue to become increasingly linked to one another. Unlike ties on land, maritime links are not clearly delineated and apportioned. The oceans stand as a god given treasure on which the nations depend for survival and prosperity. Maritime cooperation among nations could be to provide a building block for regional stability by easing tensions and reducing the risks of conflict at sea. The other type of cooperation could be to help promote a stable maritime regime in the region with the free movement of sea borne trade. Whatever may be the gain out of cooperation states do have independent interest, which may be of conflicting in nature. There may be coordinating problems among the various agencies of a nation.

National. Various maritime organizations in the country work under their individual ministries without a proper mechanism for controlling and coordinating their activities. Presently, it is not known to anyone when all the maritime agencies will be integrated or coordinated to develop mutual support for each other. Likewise, Naval Control of Shipping (NCS), which is generally activated during short of war situation need to be practised more frequently to bridge the gap of cooperation among the agencies. Department of Shipping, the main regulatory body of the country has difficulty to comply with the vast responsibilities reposed on the department due to coordination problem among various agencies. These problems can be diminished by establishing an organized Maritime Coordination Committee.

Incorporation of Maritime Strategy in BN Considering Maritime Interagency Cooperation

Maritime safety is another important aspect to be looked into. For trade and uninterrupted flow of strategic material, Bangladesh needs to emphasize on maritime safety. In this regard, maintenance of law and order and maritime safety is entrusted to BN and BCG. The maritime safety for Bangladesh not only depends on the safety in the Bay of Bengal but also is related to other adjacent shipping routes like Malacca straits. Maritime pollution arises from leakage of crude oil, petroleum products and unauthorized dumping of garbage from ships is another grey area for environmental security. This is also affecting the ecological balance. Therefore, Bangladesh needs appropriate plan as per state of maritime interagency cooperation.

A huge number of incidents of sea piracies in and around the Bay of Bengal is tarnishing the image of Bangladesh as well as hampering the development and promotion of trade. Gun running is also reportedly increasing here and due to geographical proximity, drug trafficking is also an alarming problem of the reign.

Effect on Economy of Bangladesh

Establishment of security in the maritime zone is directly related with the development and growth of country's economy. Bangladeshi economy largely

depends on the export-import. The export-import takes place in the port. Port plays and contributes a vital role in the national economy of Bangladesh. To ensure the smooth run of our economy SLOC protection is one of the prime tasks of us. Besides, oil is also a vital cargo which contributes to the economy of Bangladesh. Bangladesh is very famous to worldwide for her garments factory. The produced items are transported through high sea.

So, all the concerned maritime agencies should be cooperative with navy to ensure safe movement and protection during war time or in peace time. If these sectors collapses then the overall economy will fall drastically.

Conclusion

Cooperation can be defined as the combined effort to accomplish a task with success. So, for achieving the successful maritime goal, all the maritime agencies must have coordinated effort with BN. All maritime agencies are making effort to contribute to the national aim of achieving “well-being of the people. Most countries of the world maintain Navy for the protection of maritime agencies. Bangladesh is rich in her maritime heritage and several maritime communities operate in different sectors. BN play the leading role to co-ordinate among the maritime agencies those operate at sea. Good co-ordination can be the solution for solving the existing problems between BN and various Maritime Agencies.

Since the British period most of the maritime organizational infrastructures were built up in our country. BN and other maritime agencies are considered to be under the same umbrella that is maritime policy. For the common interest of the country, there should be very good understanding between the maritime agencies. BN has the highest scope of building up relationship with other maritime agencies. Maritime agencies and organizations are the prime working hands for disasters management. Various incidents demand for much better integration between maritime agencies. BN can take the initiative to make better coordination with all maritime agencies than before.

Recommendations

The paper makes the following recommendations :

- a. A National Maritime Committee may be formed which might hold a six monthly coordination meeting.
- b. A written National Policy regarding maritime interests of Bangladesh may be standardised.
- c. A National Search and Rescue Committee may be formed headed by BN.
- d. A National Hydrographical Activity Monitoring Committee may be formed.
- e. Effective awareness building seminars may be arranged annually in presence of all maritime agencies.
- f. Effective Co-ordination between Navy and Coast Guard may be done to reduce the piracy in the outer anchorage.

Annexe :

A. NCS ORG TREE.

B. EEZ of BANGLADESH after the Historical Verdict

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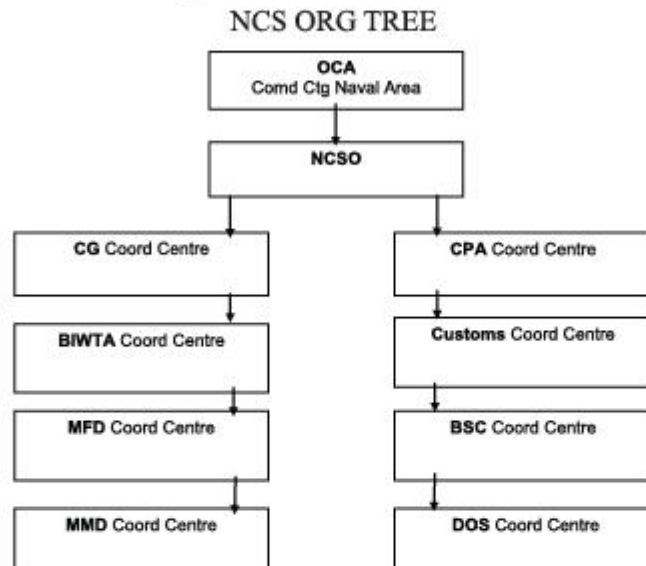
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Annex A to Service Paper



Annex B to Service Paper

EEZ of Bangladesh After The Historical Verdict





Lt Commander M Kamrul Ahsan, (X), (H3), BNVR was commissioned in Bangladesh Navy on 08 July 2007. He has completed Survey Officer Basic Course from BNS ISSA KHAN. He has done UN mission in South Sudan. Presently, he is appointed at BNS TITUMIR as Instructor, New Entry School.

MARINE BIOLOGY AND THE ECONOMY OF COASTAL NATIONS

Lt Commander N U M Khalid, (ND), PCGM, BN

Introduction

Oceans dominate the earth and exert a major influence on atmospheric dynamics and terrestrial biology. The ocean is a significant source of oxygen for our planet and is instrumental in the capture and storage of carbon dioxide. Marine species are the major biodiversity of ocean which provide important ecosystem services such as the provision of food, medicines and livelihoods. They also support tourism and recreational activities around the world which has a great economic value. Since the world is covered with approximately 70% of water, the amount of life in the oceans is enormous.

The marine resources have been playing a vital role in the national economy of many developed countries. Bangladesh including the neighboring countries is having good potentials for harnessing marine resources specially the fish resource of Bay of Bengal. The people of Bangladesh depend exclusively on the land for food and they cared little to explore the sea being a maritime country. The marine waters of Bangladesh are rich in different species, fish and fishery resources. Fisheries sector is playing a very vital role regarding employment generation, animal protein supply, poverty alleviation and foreign currency earning. Many of the available biological resources in Bay of Bengal are yet to be explored. This is mainly due to lack of appropriate technology and technical awareness and management capabilities of the public sector agencies to address the issues of the management. Policy makers and the investors of Bangladesh are not also that much aware and interested on marine sector. Key to addressing this need is the development of a well-trained scientific workforce, continued advances in research and technology, finally foresightedness of policy maker and investor.

Aim

The aim of this paper is to define marine biology and its importance for the economy of a coastal nation like Bangladesh.

The Ocean

The ocean is one of Earth's most valuable natural resources. It provides food in the form of fish and shellfish about 200 billion pounds are caught each year. It is used for transportation both by travel and shipping. It provides a treasured source of recreation for humans. It is mined for minerals (salt, sand, gravel, and some manganese, copper, nickel, iron, and cobalt can be found in the deep sea) and drilled for crude oil. The ocean plays a critical role in removing carbon from the atmosphere and providing oxygen. It regulates Earth's climate. The ocean is an increasingly important source of biomedical organisms with enormous potential for fighting disease. These are just a few examples of the importance of the ocean to life on land to explore them in greater detail to understand why we must keep the ocean healthy for future generations.

In the past ocean usages were limited to navigation and fishing. Today, seas are crucial for global food security, human health and regulation of climate. The livelihoods of over 3 billion people worldwide depend upon services from marine and coastal biodiversity. Earlier, seas brought development and prosperity by facilitating trade and commerce, ensuring uninterrupted supply of raw materials for industrialization and redistribution of finished products and goods around different corners of the world. In those days technology was not very advanced and people only focused on fishing and extraction of oil. But today, advent of advanced new technologies has opened up new vistas of opportunity for nations.

Ocean Resources. Ocean provides a unique set of goods and services to society, including moderation of climate, processing of waste and toxicants, provision of vital food, medicines and employment for significant numbers of people. Our coasts provide space to live and directly and indirectly create wealth, including millions of jobs in industries such as fishing, aquaculture and tourism.

Infusion of Main Goods and Services to Mankind. Looking at ecosystems in terms of the goods and services they provide which allow us to realize their full value and our dependence on those systems in the broadest sense. Exploitation of the environment for one purpose can alter the

environment's ability to provide other goods and services, so, this knowledge is also a way of understanding what we stand to gain and lose by exploitation of certain aspects of the environment. The main goods and services provided by marine biodiversity are :

- a. Resilience and resistance.
- b. Nutrient cycling.
- c. Gas and climate regulation.
- d. Bioremediation of waste.
- e. Biologically mediated habitat.
- f. Food provision.
- g. Raw materials, including ornamental resources.
- h. Leisure.
- j. Cultural values.

Human Impact on the Marine Environment

Oceans around the world are becoming degraded. Evidence shows that human activities, including intense fishing around the world, are altering ocean ecosystems beyond their natural state. According to numerous scientific studies, fish, shellfish, and other important species are declining in many places. These changes are impairing the ocean's capacity to provide food, protect livelihoods, maintain clean water, and recover from environmental stresses like severe storms. A recent study which has mapped the total human impact on the seas for the first time has revealed that the picture is far worse than the scientists imagined. 40% of the world's oceans have been heavily affected by human activities, including fishing, coastal development and pollution from shipping. The most severely affected areas are the North Sea, South and East China Seas, Caribbean, Mediterranean, Red Sea, the Gulf, the Bering Sea, the East Coast of North America and the Western Pacific.

How Human Activity can Affect Aquatic Ecosystems. Human activities affecting aquatic ecosystems are more likely to disrupt natural patterns and processes because species do not have the ability to adapt to the rapid changes to their environment that can occur. Human influences in the lower Athabasca basin include the oil sands operations, pulp and paper mills, municipal discharges and to a lesser extent, forestry and agriculture. Human effects on aquatic ecosystems can result from pollution, changes to the landscape or hydrological systems, and larger-scale impacts such as global climate change. The complexity of aquatic ecosystems and the linkages within them can make the effect of disturbances on them difficult to predict.

How do Shore Based Activities Affect Marine Life. The largest source of pollution found in the ocean, comes directly from land-based sources. These include factories, farms, vehicles, sewage tanks, as well as much larger industrial operations. The chemicals produced by these sources include; oil, petrochemicals, asbestos, lead, phosphates, mercury and nitrates all of which can severely impact both marine life as well as our food chain. Even though, the dumping of waste takes place hundreds of miles away from land, the ocean has a funny way of spitting it out again. Throughout history, the thought was that the ocean is so large, that dumping huge amount of rubbish, would not affect the oceans. Even to this day, it is recorded that humans dump approximately 8 million tons of plastic into the ocean every year. Over the past few decades, the speed of which the oceans are suffering has accelerated due to oil spills, plastic and toxic waste being pumped into the oceans at an alarming rate. Plastic is the biggest killer of marine life. Not only is plastic harmful for the environment, it is also mistaken for food by marine wildlife. It takes on average 400 years for plastics to degrade in the ocean. However, this trash ends up on our beaches and coastal areas and has a huge effect on the coral and wildlife that it comes into contact with on its journey to these places. This build up of pollution on the beach can also affect humans. Coming into contact or mistakenly ingesting the water surrounding this pollution can result in some nasty side effects such as stomach-aches, diarrhea or even skin rashes. Did you know that there is a floating 'Garbage Island' also known as the 'Pacific Garbage Patch' or the 'Pacific Trash Vortex', which is located in the north Pacific, just off the coast of

California ? It is the largest oceanic rubbish patch in the world.

Crude oil is the most dangerous and fastest cause of oceanic deterioration. However, only 12% of oil entering our oceans comes from oil spills. 36% of the oil found in our oceans actually comes from land run-off, and that is causing most damage to oceanic ecosystems. Crude oil can suffocate marine life, cause disorientation and poisoning if ingested. To those creatures that survive, this can cause long-term issues which may result in them never returning to their natural habitats.

Challenges Ahead for Bangladesh

The Likelihood Marine Biological Resources of Bangladesh

Bangladesh is a maritime nation. The country is situated at the North end of the Bay of Bengal between latitude 2034 and 2638 North and longitude 881 East. The Bay of Bengal has immense economic prospect and the littoral states have their definite maritime interest in exploring and exploiting their resources under the legitimate right. The Maritime Economic Zone of Bangladesh is rich in living and non-living resources as well, which are of immense economic value to the country. Bangladesh has approximately a sea area which is roughly equal to 83% of her land mass, in which Bangladesh has the exclusive right to exploit and explore all pelagic and non-pelagic (mineral) resources.

Ways to Go Ahead. For the geographical location being blocked from three sides, the Bay of Bengal in the south is the only exit for us for international trade and as a source of marine assets. One fifth of the country's total population is directly dependent on the marine or maritime sector for economic activities, ranging from fishing, salt cultivation, shrimp production, other aqua-culture, oil and gas production. Our economy is advancing towards a prosperous future and very shortly Bangladesh will transform itself into a middle-income country beyond any doubt. But at the same time, for maintaining the space of development, industrialization and in view of depleting land-based resources and population growth, Bangladesh has to look more towards the sea as a source of energy, food, medicine and other strategic minerals. A number of challenges are

associated for ensuring the proper management of marine biological resources in Bangladesh, like :

- a.** The knowledge-gap with regard to ascertaining concentration and size of the resources.
- b.** There is lack of ocean governance framework and adoption of “Ocean Policy” to address the complex interactions of resource base, users, stakeholders, opportunities, threats and marine spatial planning etc.
- c.** Legal and institutional framework needs further refinement, for example limit of maximum catch, fishing boats registration, maximum/minimum depth determination, environmental norms etc.
- d.** Lack of knowledge, research needed human resources and technology base etc are yet another stumbling block.
- e.** There is a challenge in terms of environmental and social impact study.
- f.** Lack of investment in marine sector, improper allocation of roles and designation of focal points.
- g.** Inadequate public participation and stakeholder inclusion.
- h.** The lack of coordination and integration among laws, agencies, and stakeholders.

Conclusion

The conservation of marine biodiversity is a major environmental issue that promises to remain at or near the top of the environmental agenda for the foreseeable future. The loss of biodiversity affects human welfare as well as being lamentable for its own sake. Humans depend on natural systems to produce a wide variety of ecosystem goods and services, ranging from direct use of certain species for food or medicines to ecosystem functions that provide water purification, nutrient retention or climate regulation. Threats to biodiversity

include habitat loss and fragmentation, the introduction of no indigenous species, over-harvesting, pollution, changes in geochemical cycles and climate change. Sustaining biodiversity in the face of increasing human populations and increased human economic activity promises to be a major challenge.

Effective maritime spatial planning aims to alleviate this problematic situation, proposing alternatives for mitigation of the negative effects and to restore the affected marine ecosystem. Maritime spatial planning is about the place and time marine human activities exist. It reduces conflicts between working sectors among different agencies and creates synergies between different activities. It also secures coordination between neighboring coastal countries and enhances cross-border cooperation, while protecting the environment by identifying the impact and opportunities for multiple use of space. This is a holistic approach that policy maker, investor and finally government can be pioneer for collaborating this issue.

Recommendations

The following recommendations have been made :

- a.** Outreach, participatory dissemination, maritime awareness campaign should be raised to coastal people irrespective of whole country.
- b.** Technological and instrumental improvement should be developed in marine sector.
- c.** Ocean governance framework and adoption of “Ocean Policy” must be there.
- d.** Food security and sustainable marine fisheries management, safe navigation and fishing operation by fishermen must be ensured.
- e.** Maritime agencies should be stricter on law enforcement and be more co-operative to each other for law enforcement.
- f.** Policy maker and government should emphasize more on sustainable blue growth activities.

g. Electronic media personnel should focus and highlight the importance of marine biodiversity.

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Biography of the Writer



Lt Commander N U M Khalid, (ND), PCGM, BN was commissioned on 1st December 2010 in the Executive Branch of Bangladesh Navy. He completed his basic course from BNS ISSA KHAN. He has undergone International Maritime Officers Course in US Coast Guard Training Centre, Virginia, USA. He served onboard various ships and bases of Bangladesh Navy and Coast Guard in different capacities. Some of his appointments include Executive Officer, CGS TAWHEED, Operation Officer Coast Guard South Zone. At present, he is appointed as the executive officer of BNS GOMATI.



Navy Journal is a professional journal of Bangladesh Navy. It is published once in a year. Its purpose is to reflect the innate potentials of Professional Naval Officers who will find a common platform for exchanging their valuable ideas, experience, knowledge and information. The publications of articles related to sea based research works, shipbuilding industry and other maritime issues like UNCLOS, Oceanography, Technology, Civil Military Relations etc will provide an impetus to the think tanks of both government and civil policy makers regarding the development and protection of our enormous maritime resources.

The Editorial Board welcomes original works, recommendation analyzing security issues for future development to enhance the activities of Bangladesh Navy. Stake holders of maritime domains will be benefited also from this publication.

Naval Headquarters, Dte of Naval Education Services

Banani, Dhaka 1213, Bangladesh.

Tel: 9836141-9/2250 Fax: 9836270, 9885633

Email: dnes@navy.mil.bd

web: www.navy.mil.bd