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Editor's Note

The end of second decade of the Twenty-First century has brought about unprecedented challenges for the whole world. The evolving contours of modern geopolitics are still in a state of flux, and the conflict in Ukraine heralded the most significant geopolitical shift since the end of the Cold War. However, as a peace-loving nation, we expect that this precarious epoch will end and humanity will prevail.

It is a matter of great contentment that the Volume 3, Issue 1, November 2022 issue of BIMRAD Journal has been published. BIMRAD was established as an independent think tank to study, research and recommend the policy issues pertaining to maritime interests and support the government in foreseeing the sustainable development of the country's Blue Economy initiatives. BIMRAD journal illustrates that initiative and is a defining milestone of this year's achievement. BIMRAD has spearheaded multi-faceted brainstorming, research, and academic engagement within the maritime community throughout the year. This publication by BIMRAD showcases the results of that arduous effort of our team.

The BIMRAD Journal is a peer-reviewed open-access journal available in online and print versions. Such efforts will not only serve as a testament to the original research works published in this journal but also will act as an inspiration to underpin original research works able to withstand the rigorous test and trial of the peer-review process.

This November issue, 2022, includes six research papers encompassing topics of various disciplines. The authors are scholars, practitioners, researchers and academicians. These papers comprehensively explore the strategic and economic issues providing critical insights and essential recommendations. We are confident, these research works will pave the way for further academic discourse and generate suggestions at the policymaking level. I would like to express my gratitude to the contributing researchers who have done a commendable job by presenting valuable and insightful research works.

On behalf of my team, I would like to express our heartfelt gratitude to our Chief Patron, Acting Chairman and Editorial Advisory Board members for their inspiring and unwavering support in publishing this issue.

BIMRAD strives to continue adding quality research works in the maritime literary arena of Bangladesh, and this journal will hopefully be a worthy addition to it.

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NO PLACE TO CALL HOME: HISTORICAL CONTEXT, STATELESSNESS AND CONTEMPORARY SECURITY CHALLENGES OF ROHINGYA REFUGEE CRISIS

Rubiat Saimum

Abstract

The Rohingya refugee issue is one of the pressing problems in the world. It has been one of the world's most significant refugee crises. This paper seeks to explore the key historical issues of the world. The paper would tap into these two important discourses to understand the whole Rohingya issue in the context of history and contemporary politics of Myanmar. The paper would explore the key issues related to the marginalization of Rohingyas from a historical point of view. It would analyze the role of legal frameworks within Myanmar behind Rohingya statelessness and positions of various actors in Myanmar in maintaining the status quo on the Rohingya question. Finally, it would shed light on the security issues in Bangladesh because of the presence of Rohingya refugees. The paper would adopt a qualitative and descriptive approach to explore the major issues pertinent to the issue.

Keywords: Rohingya, Refugee Crisis, Ethnic Cleansing, Statelessness

Introduction

The Rohingya refugee issue is a long-standing unresolved protracted refugee situation. It is a tale of marginalization, persecution, and statelessness of over two million people who call the Rakhine State of Myanmar as their home. The persecution of Rohingyas has made them live in inhuman conditions without basic rights and protection of the state, while being subjected to continuous violence which led to expulsion from their lands to neighbouring states like Bangladesh. The most recent violence occurred in August 2017 after Arakan Rohingya Salvation Army (ARSA) attacked the security forces in Myanmar. In retaliation, the Myanmar military launched a devastating operation in the north of the province which has caused a new refugee influx into Bangladesh. The international community, by and large, has condemned the military actions of Myanmar, the United Nations Human Rights Commission even termed the atrocities committed by the Security forces of Myanmar as the "Textbook example of ethnic cleansing". But the global condemnation failed to stop Myanmar from

pursuing its policy of “extermination” of the Rohingya population, mostly because of the political support it received from regional and global powers. The Rohingyas were, in many ways, victims of the domestic political equations in Myanmar and geo-political rivalries among the global powers.

Bangladesh has been at the receiving end of the crisis. Despite its resource scarcity, it has been forced to accommodate close to a million Rohingya refugees. The Rohingya refugee population has also put an additional burden on Bangladesh’s national budget.¹ The presence of the refugees has created a number of socio-political problems in the country. Though the Rohingyas have been residing in the country for a long period of time, they have limited rights in the country, as successive governments of Bangladesh have imposed a series of restrictions on their movement and employment opportunities. The foreign aid sanctioned by the international community is not sufficient to uplift the community and provide a better quality of life.

To comprehensively understand the Rohingya issue, it is necessary to highlight two important aspects: Firstly, the debate on the historical presence of the Rohingyas in the Rakhine state. The Myanmar government has made repeated claims that the Rohingyas are not indigenous to the Arakan or the Rakhine region and are recent immigrants from the Bengal region, currently part of Bangladesh. In order to protect the ‘indigenous’ population of the Rakhine region, Myanmar has instituted a regime of the political and abusive socio-economic system on Rohingyas, that can only be compared to South African apartheid. The Myanmar government has enacted the 1982 citizenship law that rendered Rohingyas stateless. The second question is the contemporary marginalization of the Rohingya population. What factors are responsible for it? The exodus and sufferings of the Rohingyas are directly related to the internal political dynamics of the Rakhine state. The nexus between the religious establishment and the Military Junta has been a prime factor blocking any reconciliation and integration of Rohingya people into the national fabric of Myanmar.

The paper would tap into these two important issues to understand the whole Rohingya issue in the context of history and contemporary politics of Myanmar. The paper will explore the key issues related to the marginalization of Rohingyas from a historical point of view. It would analyze the role of legal frameworks within Myanmar behind Rohingya statelessness and positions of

¹ Jobair Alam, “The Rohingya of Myanmar: theoretical significance of the minority status”, *Asian Ethnicity*, vol 19, no. 2, 2018, p. 180-210, DOI: 10.1080/14631369.2017.1407236.

various actors in Myanmar in maintaining the status quo on the Rohingya question. Finally, it would shed light on the security issues in Bangladesh because of the presence of Rohingya refugees. The paper would adopt a qualitative approach to explore the major issues pertinent to the issue. The paper would take qualitative literature into account to formulate the arguments and describe the findings qualitatively.

Rohingya Issue in Context of Ethnicity and Nationalism

The historical context is the first step to understanding and deciphering the underlying issues of the Rohingya refugee crisis. The government of Myanmar claims that there is no such ethnic group called “Rohingya” exists in the country and most of the Muslims of Rakhine state, in reality are illegal immigrants from neighbouring Bangladesh. It uses a special term called “Taingyintha” to denote the so called 135 “National races” of the country who are according to Myanmar Government are indigenous to Myanmar. The concept of “Taingyintha” was embedded in the 1974 constitution of the state which calls for the promotion “mutual respect and unity” among the national races of the country.² As a result, the concept of “national race” became the central discourse of nation-building in Myanmar and at the same time gradually shaped the political project of marginalizing the Rohingya population.

The origin of the Rohingya people is an issue of controversial debate in academia. There are two major theories regarding the history of the Rohingya People. First theory suggests that Rohingyas are “*Descendants of Moorish, Arab and Persian traders, including Moghul, Turk, Pathan and Bengali soldiers and migrants, who arrived between 9th and 15th centuries, married local women, and settled in the region. Rohingya are, therefore, a mixed group of people with many ethnic and racial connections*”.³

However, Myanmar's government sanctioned historical narrative suggests that the “Rohingyas” are only Bengali immigrants who came along with the British imperialists after the Burmese defeat in the first Anglo-Burmese war in 1824. As a result, Myanmar considers all people who settled in the country after 1823 as “foreigners” and “illegal immigrants”. Thus Myanmar has repeatedly rejected the

² Nick Cheesman, "How in Myanmar “national races” came to surpass citizenship and exclude Rohingya", *Journal of Contemporary Asia*, vol 47, no. 3, 2017, p. 461-483.

³ Imtiaz Ahmed, "The Rohingyas: From stateless to refugee", Dhaka, Bangladesh: University of Dhaka, 2009, p. 285-301.

term “Rohingya” which it believes, will give an impression that Rohingyas are a separate ethnic group. The historians generally agree on the Muslim presence in Myanmar long before the arrival of the British, for example, the Muslim groups such as Kamans, Pashu and Panthays have official status in the country and the state recognizes them as citizens. Moreover, historical accounts show that in the dynastic periods, successive Burmese kings had patronized the Muslim communities living in the country and promoted them to higher positions in the state administration. King Mindon of the Konbaung dynasty even built accommodation facilities for Burmese Muslims taking pilgrimage in Mecca.⁴ But the “Rohingya Muslim identity” has become a matter of controversy in the country. Since 1970’s, different organizations and scholars have been using terms other than “Rohingya” such as “Burmese Muslims” or “Arakanese Muslims” to describe the Muslims of Rakhine state.

There is contested historical evidence to determine the origins of the “Rohingya” people. The ties between Bengal and the Arakan are ancient. Before the Burmese conquest of the Arakan in 1784, the kingdom had extensive ties with Bengal. After the Burmese conquest, these ties were broken. The Muslim influence is also notable in the Arakanese court who adopted Arabic and Persian names in addition to their own. It is noted that, “the Arakanese kings, though Buddhist in religion, became somewhat Mahomedanised in their ideas”.⁵ The Arakanese brought many slaves from Bengal who later settled in the region and served as soldiers, scholars and court administrators. The word Rohingya first appeared in western literature in a book written by Dr. Francis Hamilton Buchanan in 1799, long before the conquest of the British Empire. He mentioned that a “Muslim group” called “Rooinga” were living in Arakan along with the Buddhist Rakhines.⁶ A protestant missionary named, J.C Fink who travelled Arakan and Chittagong hill tracts for missionary purposes described native Arakanese Muslims as descendants of slaves brought by the Mughls from Bengal. In his accounts, the Muslims of Arakan preserved the religion and language of their forefathers and were living in harmony with the rest of the population. Mohammad A. Tahir Ba Tha in his book the “Rohingyas and Kamans of Burma” (1963) argued that Rohingya historical identity is rooted in ancient Hindu-Buddhist culture that existed in Arakan before

⁴ Saito Ayako, "The formation of the concept of Myanmar Muslims as indigenous citizens: Their history and current situation", *The Journal of Sophia Asian Studies*, vol 32, 2014, p. 25-40.

⁵ Swapna Bhattacharya, "Islam in Arakan: An interpretation from the Indian perspective: History and the Present", *Rohingya League for Democracy (Burma) RLDB*, vol 1, 2012.

⁶ Azeem Ibrahim, “The Rohingyas: inside Myanmar's genocide”, Oxford University Press, 2018.

the arrival of the Rakhines in the region.⁷ Moshe Yegar (1972), another prolific historian, argued in his book “Muslims of Burma” that Rohingyas have been present in Arakan since the 8th century as Arab and Persian sailors dominated the seaborne trade in the Indian Ocean during the medieval era.⁸

Though several evidences suggest a high “Muslim” immigration from the British India to upper Burma, for example, in the census of 1869, the Muslims make up merely 5% of the total population in Arakan, which increased up to 30% in 1912.⁹ It has been evident that Indians migrated to Myanmar as traders and bureaucrats to Burma under British colonial rule. The economic and administrative domination of Indians in Burma, was one of the earliest catalyst of anti-Indian and later anti-Muslim sentiments among Burmese nationalists.¹⁰ However, the presence of Muslims in Myanmar cannot be put solely on the onus of British colonialism. The present borders among the former colonies of the empire are mostly colonial impositions, cartographically curved out without consultation with local population or taking the demographic composition into account. Even in the pre-colonial era, the borders between kingdoms and empires were fluid and unmarked, the migration, thus, was a common phenomenon. There is a large Rakhine population in the South-West of Bangladesh, therefore, terming the Muslims of the Rakhine as Bangladeshi immigrants is historically flawed,¹¹ and especially given the Rohingya community has been living in Rakhine before the creation of Bangladesh or even the Myanmar state itself.

The firm opposition of Buddhist monks towards Muslims in general and “Rohingyas” in particular have also shaped the general perception towards Muslims in the country. In the colonial period, the Buddhist monks formed “Young

⁷ Nasreen Chowdhory and Biswajit Mohanty, "Contextualizing Citizenship, Nationalism and Refugeehood of Rohingya: An Introduction", In *Citizenship, Nationalism and Refugee hood of Rohingyas in Southern Asia*, Springer, Singapore, 2020, p. 1-30.

⁸ Ibid.

⁹ Jacques Leider, "Rohingya: The history of a Muslim identity in Myanmar", In *Oxford research encyclopedia of Asian history*, 2018.

¹⁰ Kunal Mukherjee, "The ethnic minority question and rohingya crisis in contemporary Myanmar", *Journal of Muslim Minority Affairs*, vol 39, no. 1, 2019, p. 26-43.

¹¹ Rubiat Saimum, "ASEAN's Rohingya Dilemma: Limits of Regional Co-operation", In *Charting a Sustainable Future of ASEAN in Business and Social Sciences*, Springer, Singapore, 2020, p. 339-348.

Men Buddhist Association” to fight British rule in the country. As a result, the Muslims, especially the Muslim lenders and businessmen, were portrayed as agents of colonialism who exploit the local people. Even after the independence, the Buddhist Sanghas continued to hold enormous influence over the country which neither the military nor the democratic opposition could challenge.¹² Thus even Aung Sun Suu Kyi and her National League for Democracy maintained utter silence when the Monks instigated riots against Rohingya minorities.

Year	Event
1948	Independence and foundation of the Union of Myanmar.
1948	Union citizenship Act was enacted.
1962	The first military coup and General Ne Win took power.
1974	Emergency Immigration Act was instituted to curtail alleged migration into Myanmar.
1978	Operation Nagamin was carried out by Burmese government and close to 200,000-250,000 Rohingyas were displaced.
1982	Citizenship law was enacted and Rohingyas were denied citizenship rights.
1991	Second Rohingya exodus took place with 300,000 Rohingyas fleeing to Bangladesh.
1992	Bangladesh-Myanmar repatriation agreement and 230,000 Rohingyas returned to Myanmar.
2012	Anti-Rohingya riots in Rakhine state and up to 100,000 people, mostly Rohingyas, were displaced.
2015	The Rohingya Boat crisis ensued and almost 50,000 people were forced to migrate to South-East Asia through boat.
2017	Myanmar military carried out an anti-insurgency operation which caused a refugee exodus. 700,000 Rohingyas arrived in Bangladesh.

Table 1: Timeline of Rohingya Refugee Crisis

The Question of Citizenship and Systemic Marginalization

The complex citizenship law of Myanmar is one of the major impediments towards the full integration of the Rohingya community into the national fabric. Unlike other states, Myanmar grants citizenship based on “Historical ancestry”, even if some groups are residing in the country for centuries. The section 11 of the 1947 constitution guaranteed citizenship to the ‘indigenous races’ within Myanmar. However, it also kept options for people who were already living in Myanmar when the country became independent. The 1948 citizenship Act was formulated on the basis of the 1947 constitution. But the 1948 act was replaced by the 1982 citizenship law which established a stratified system of three types of citizenship, namely: Full citizens, the descendants of people who were residing in Burma prior to 1823. Associate citizens, those who acquired citizenship under 1948 act and Naturalised citizens, those who have acquired citizenship after 1982.

¹² Ian Holliday, "Ethnicity and democratization in Myanmar", *Asian Journal of Political Science*, vol 18, no. 2, 2010, p. 111-128.

The ruling Military regime in Myanmar denied the Rohingyas citizenship as they failed to fulfil the criteria of ancestry.¹³ The entire Rohingya population thus became stateless without electoral, political, and civil rights.

The provisions of 1982 citizenship law put the burden to prove their citizenship on the shoulders of the Rohingya people which made the process even more complex. Given the fact that most Rohingyas are uneducated and have limited legal resources, it became impossible for the community to prove their indigenous identity against the state, which seeks to disenfranchise them. Historically, Asian countries, in general, have been very poor in documentation and registration of population. Besides, the concept of census and population registration is comparatively new to Asia. The first modern scientific census in the history of Myanmar was carried out by the British in 1872. The 1872 census found that Muslims were 'settled in the Rakhine province for many generations' and 'have little to distinguish them from the Arakanese except their religion'.¹⁴ The same census suggested that Muslims made up 20% of the total population of Northern Rakhine during that period. These reports in fact, prove the Muslim presence in the region as early as 18th century, contrary to Myanmar's claim that Muslims are recent immigrants from Bangladesh.

However, the 1982 citizenship law could not be alone blamed for the statelessness of the Rohingyas. Kyaw (2017) argued that despite discriminatory provisions of the 1982 law, the real causes of the statelessness are more de-facto than de-jure. The successive Myanmar governments have declined to recognize the Rohingya minority groups and even to implement the 1982 law. In the 1970's the Rohingyas were given the National Registration Cards (NRCs) which sufficiently proves their citizenship.¹⁵ Despite the legal complexities due to the 1982 law, Rohingyas held white cards since 1995 and were allowed to vote in the 1990 general election, 2008 constitutional referendum and the 2010 general election. It was not until 2013, when Myanmar authorities began to suppress the political rights of the Rohingyas on a large scale under the pressure of Buddhist nationalist groups.¹⁶ As a result, these cards were revoked in 2015 to limit their

¹³ Cheeseman, 2017.

¹⁴ Burmese census, 1872.

¹⁵ Nyi Nyi Kyaw, "Unpacking the presumed statelessness of Rohingyas", *Journal of Immigrant & Refugee Studies*, vol 15, no. 3, 2017, p. 269-286.

¹⁶ *Ibid.*

presence in the political space, putting them in a legal limbo.¹⁷ Because Rohingyas can no longer serve in the national parliament, they cannot channel their grievances at the national scale. It also removed the possibility of reconciliation with other ethnicities in the country. These limitations in civic and political rights have stalled the solution of the Rohingya crisis. At the same time, this political oppression has strengthened the hardliners within Myanmar's society who seek to marginalize the Rohingya minority in the country. Myanmar's authority has destroyed numerous mosques, Islamic schools and other religious monuments in the northern Rakhine state. Myanmar has long accused the Rohingyas of conspiracy to increase population in order to create an Islamic state in the Rakhine state. In a draconian measure, the government has imposed an arbitrary two child policy on the Rohingya people. In a draconian measure, the government has imposed an arbitrary two-child policy on the Rohingya people.¹⁸

Those couples who fail to comply with the policy are sometimes forced to go through painful and unhygienic abortion procedures that took a toll on women health. If the women chose to give birth, they may face the threat of being blacklisted by the authorities. In such cases, the children may face legal consequences such as deprivation of legal status, inheritance and exclusion from education and employment opportunities. In order to obtain marriage licences, the Rohingyas have to seek permission from the government.¹⁹ The Rohingya women faces great sexual and physical violence in the hand of Myanmar's security forces. The Human rights watch had documented a series of testimonies by Rohingya women facing violence at the hand of Myanmar security forces. The Myanmar security forces have carried out sexual crimes at massive scales against the Rohingya women. There are several instances of 'mass rape' against the Rohingya women during the 2017 crisis.²⁰ These crimes were also perpetuated against ethnic and religious minorities in the Bosnian war in the 1990s and Bangladesh's war of

¹⁷ A. K. M Ahsan Ullah, "Rohingya crisis in Myanmar: Seeking justice for the "stateless"", *Journal of Contemporary Criminal Justice*, vol 32, no. 3, 2016, p. 285-301.

¹⁸ Parveen K Parmar, Rowen O. Jin, Meredith Walsh and Jennifer Scott, "Mortality in Rohingya refugee camps in Bangladesh: historical, social, and political context", *Sexual and reproductive health matters*, vol 27, no. 2, 2019, p. 39-49.

¹⁹ Syed S Mahmood, Emily Wroe, Arlan Fuller and Jennifer Leaning, "The Rohingya people of Myanmar: health, human rights, and identity", *The Lancet*, vol 389, no. 10081, 2017, p. 1841-1850.

²⁰ Human Rights Watch, "All of my body was pain-Sexual violence against Rohingya women and girls in Burma", Available at: <https://www.hrw.org/report/2017/11/16/all-my-body-was-pain/sexual-violence-against-rohingya-women-and-girls-burma>.

liberation in 1971. These actions clearly constitute war crimes against non-combatants. This principle is recognized in the international legal framework as ‘crime against humanity’ and ‘war crime’. United Nations Security Council resolution 1820 recognized this issue in its text:

“Rape and other forms of sexual violence can constitute war crimes, crimes against humanity, or a constitutive act with respect to genocide.”²¹

The Myanmar government has used ‘ethnic cleansing’ and ‘genocide’ to advance their goal of ‘Burmanization’ of the entire country. The ethnic conflict is not new in the country. There are numerous groups in the country fighting against the government, however, Myanmar has selectively targeted the Rohingyas because of their race and religion. In Myanmar’s view, nation-building has been an incomplete process. The only way the nation can be united, is through assimilating non-Burmans and non-Buddhist ethnicities with the wider Burmese society, even with force if necessary. The Military regime in Myanmar has used the Anti-Rohingya and Anti-Islamic sentiments prevailing among the general population to strengthen its national building project. The solidarity among the “National races” and “Buddhism” became the two main pillars of the nation building process in Myanmar thus Rohingyas were removed from the national fabric as their ethnic and religious identity are incompatible with the broader Burmese identity.

History of Rohingya Militancy

Throughout history, the Rohingya people have made many attempts to secure their freedom of ‘self-determination’. However, the inter-communal ties between the Buddhist and the Rohingya muslim community have not been very well during the colonial era. During the Second World War, the relations between the two communities began to deteriorate when the British authority armed and backed the Rohingyas against the Japanese invading army, while Burmese nationalists allied themselves with Japan who promised them self-rule and independence.²² The Rohingyas distrusted the Burmese Nationalists and feared that in case of an independent Myanmar, they might lose their autonomy and civil rights within a Buddhist majority society.

²¹ Kerry K Paterson, “When rape became a war crime (hint: It’s not when you think)”, Available at: <https://womensmediacenter.com/women-under-siege/when-rape-became-a-war-crime-hint-its-not-when-you-think1>.

²² Mahburur Rahman and Haradhan Kumar Mohajan, "Rohingya-The Stateless Community Becoming the Lost Generation", Journal of Economic Development, Environment and People, vol 8, no. 2, 2019, p. 24.

The Rohingyas had sought to be a part of the newly independent Pakistan. A Rohingya delegation met with Pakistan's founding father Muhammad Ali Jinnah and proposed that he annex the Muslim majority Northern Rakhine region to the East Pakistan, present-day Bangladesh. However, the initiative did not materialize after the death of Jinnah. Many Burmese nationalists saw these attempts as evidence of Rohingya people's 'separatist tendencies'.²³ After the independence of Myanmar in 1948, numerous groups were formed to secure the Rohingya self-determination goal. The Rohingya Independence Front (RIF), an 'ethno nationalist' group was formed in 1962 to protect the rights of the minority group. The Rohingya Patriotic Front (RPF) emerged from the RIF to establish an autonomous zone in the Northern Rakhine, although it was largely eliminated after the operation Nagamin in 1978.²⁴ There was another well-known group known as Rohingya Solidarity Organization (RSO) formed in 1982, with an agenda to secure Rohingya rights within the Myanmar Union. The Group established their presence among the Rohingya refugee population in Bangladesh to carry out operations inside Myanmar. However, Bangladeshi security forces carried out counter-insurgency operations against RSO in 2001, which severely decimated the organization's operational capabilities.²⁵ There has been other militant groups that Myanmar government has claimed maintained ties with International terrorist groups. After 2001, Myanmar government had shared intelligence with United States which indicated that militants from the Arakan Rohingya National Organisation (ARNO) have taken training with international terrorist organizations abroad. Despite these claims, the Rakhine have remained relatively calm without any trace of international terrorism.²⁶ The rise of ARSA as the face of Rohingya resistance in the post-2017 exodus has brought scrutiny towards the militant group. Based on the group's founder's alleged ties with Pakistani terrorist entity Lashker-e-Taiba (LeT). However, most of these reports are based on mere speculations and un-verifiable 'intelligence sources'.²⁷ None of these reports or speculations have provided any concrete evidences to support such claims.

²³ Harrison Akins, "The two faces of democratization in myanmar: A case study of the rohingya and burmese nationalism", *Journal of Muslim Minority Affairs*, vol 38, no. 2, 2018, p. 229-245.

²⁴ Jasminder Singh and M. H. Bin Jani, "Myanmar's Rohingya Conflict: Foreign Jihadi Brewing", *RSIS Commentary*, vol 18, 2016.

²⁵ Elliot Brennan and Christopher O'Hara, "The Rohingya and Islamic extremism: A convenient myth", *The Diplomat*, vol 29, 2015.

²⁶ *Ibid.*

²⁷ C. Christine Fair, "Arakan Rohingya Salvation Army: Not the Jihadis You Might Expect", *Lawfare*, 9 December 2018.

Moreover, ARSA has repeatedly denied ties with Jihadists groups and refrained from endorsing any Sharia based governance system. Politically, ARSA has nothing to gain from siding with Islamist elements.²⁸

Post 9/11, there has been numerous attempts by the Myanmar government to designate the Rohingya groups as terrorist on basis of their alleged connections with international Jihadists. Despite the lack of evidences to directly draw such links, Myanmar authorities have continuously used the ‘international Jihad’ argument to delegitimize the political aspirations of the Rohingyas. Interestingly, numerous militarily strong separatist insurgent groups are active in other parts of Myanmar. However, Myanmar government have been refrained from designating these groups as terrorists. The Myanmar government even signed 16 ceasefire agreements with different militant outfits by 1995, which led to the creation of so-called ‘special regions’, which are de-facto administered by the ethnic armed factions within a framework of autonomy. By 2008, 17 more agreements were signed between the government and the militant groups, legitimizing the agenda of these insurgent movements. These insurgent groups have also formed a Nationwide Ceasefire Coordination Team (NCCT) to negotiate a Nationwide Ceasefire Agreement (NCA) with the government. However, the 16 organization umbrella group NCCT has no Rohingya representation. This shows that Myanmar government has arbitrarily designated the Rohingya groups as ‘terrorist’ while defined other militant groups as simply ‘Ethnic Insurgents’.

Rohingyas and the Internal Political Dynamics of Myanmar

The domestic politics of Myanmar is also a factor behind the persecution of the Rohingya people. Myanmar’s political arena is dominated by mainly three different power centres: The military, The Buddhist Sangha and the National League for democracy. There has been constant competition between these groups to assert political power and gain state support. The Buddhist monks generally have gained state support since the pre-colonial era. However, their power and influence began to diminish considerably after the British colonization of Myanmar. In the post-independence era, the Sangha tried to play an important role in Myanmar’s national politics. Especially, during the early stages, it vigorously tried to defend the Buddhist nature of the country against the increasing secularization of the state and society. The Sangha though nominally independent of the state, has great influence on the latter, given its role as the interlocutor between the state and the society. Though the Theravada traditions strongly

²⁸ C. Christine Fair, "Arakan Rohingya Salvation Army: Not the Jihadis You Might Expect".

discourage the monks from the participating in politics, the monks view the relations between the state and the Sangha symbiotically, where the Sangha has the duty to intervene whenever the state fails to protect the 'faith'.²⁹

In their defence of state, race and religion, the Sangha has always been suspicious of the Rohingyas whom they see as an agent of 'Islamization'. They have constantly raised unfound conspiracy theories about the possibility of Rohingyas being aligned with International Muslim groups to transform Myanmar into an Islamic state. The state and Sangha have cooperated against the Rohingya Muslims with a view to subjugate them. The Buddhist monks have instigated and directly supported violence and riot against the Muslim minority groups and routinely provided religious justifications of violence against Rohingya at the hand of the security forces.³⁰ The Buddhist associations such as 969 movement and Ma Ba Tha have long presented Muslims as 'Cancer within'. These groups regularly point out that the 'Western gate' of the country in the Rakhine state is particularly susceptible to an imagined 'Islamic threat'. If Rohingyas are not contained, there is a possibility that the country's Buddhist majority would be overwhelmed by the Muslims from Bengal. To confront this so-called Islamic threat, groups like Ma Ba Tha have forayed into party politics. In 2015 general election, the group offered its support to the Junta led Union Solidarity and Development Party (USDP), accusing the pro-democracy NLD as 'Pro-Muslim'. While the USDP suffered a major defeat in the election, this was not necessarily a referendum on the popularity of the Buddhist nationalists, who according to many analysts remained a central force in Myanmar's society.³¹

The Rohingya issue has also complicated the stances of the National League for democracy. The NLD is walking on the thin water on the Rohingya issue. The constitution of Myanmar allocated 25% of seats to military officials who have maintained considerable power in the country.³² For Suu Kyi and NLD, standing with the Rohingyas meant alienating her core base of Bamar Buddhists, from which the party received its popular support and legitimacy. It also entails confronting the powerful Sangha, who could potentially tip the balance of power

²⁹ International Crisis Group, "Buddhism and state power in Myanmar", Crisis Group Asia Report no. 290, 2017.

³⁰ Francis Wade, "Myanmar's enemy within: Buddhist violence and the making of a Muslim 'other'", Bloomsbury Publishing, 2019.

³¹ International Crisis Group, 2017.

³² Sean Turnell, "Myanmar in 2011: confounding expectations", Asian Survey, vol 52, no. 1, 2012, p. 157-164.

in the favour of the military. Sensing the political danger, Suu Kyi has essentially parroted the Military's talking point of accusing the Rohingyas behind the 2017 ethnic cleansing. She defended the military's brutal assaults and accused the 'terrorists' behind the 'iceberg of misinformation'.³³ However, there is a ray of hope in this crisis: the military takeover of power on February 1, has prompted a wide-spread protest against the Military Junta's unlawful takeover of power. Many Myanmar protesters have supported the plight of the Rohingya people. It seems that the public opinion regarding the Rohingya people have shifted considerably. There is a possibility that the majority population could accept the Rohingya minority in a future democratic Myanmar.

Rohingya Refugee Crisis and Contemporary Security Challenges

The presence of more than a million Rohingyas in Bangladesh has been regarded as a multi-dimensional security issue for the country. Myanmar's refusal to consider the Rohingyas as citizens of Myanmar and the lack of initiative to repatriate the Rohingyas have been major obstacles to peacefully resolve the problem. On paper, Myanmar agrees to the principle of repatriating the Rohingyas back to Rakhine state. However, Naypyidaw has not provided any guarantees to the Rohingya population regarding their protection and citizenship. A large majority of the Rohingya population has rejected attempts of repatriation without any such guarantees from Myanmar.³⁴ The presence of refugees has exacerbated the security situation in the Southern part of the country. The issue of drug trafficking has become the core security issue for Bangladesh. The Rohingya refugees are being exploited by militant outfits in Myanmar to traffic synthetic drug methamphetamine (locally known as Yaba) to Bangladesh. The Arakan army uses Rohingya carriers to traffic these drugs sourced from the Shan state of Myanmar. Multiple militant groups use wealth accumulated from the drug trade to fund their activities and operations. The Rohingya play a significant role in functioning the drug-weapons cartel and the drug trafficking route that extends from Shan state of Myanmar to Bangladesh's capital Dhaka.³⁵ The issue of drug trafficking via Rohingya carriers thus has become a regional security issue because of the involvement of transnational groups in the process.

³³ Harrison Akins, "The two faces of democratization in Myanmar: A case study of the Rohingya and Burmese nationalism", *Journal of Muslim Minority Affairs*, vol 38, no. 2, 2018, p. 229-245.

³⁴ R Paul, "Bangladesh, Myanmar agree to begin Rohingya repatriation", Reuters, 2018, Available at: <https://www.reuters.com/article/us-myanmar-rohingya/bangladesh-myanmar-agree-to-begin-rohingya-repatriation-by-mid-november-idUSKCN1N414Q>.

³⁵ V. M Ginke, "Rohingya Refugees Smuggle Drugs for Insurgents in Myanmar", *New Security Beat*, 2020.

The Rohingya refugee issue has also altered the social fabric of the Cox's Bazar region of Bangladesh. The locals surrounding the Rohingya refugee camps, have some latent fear that they could become minorities in their own land, given the demographic ratio of 1:3 favours the Rohingyas in those parts of Cox's Bazar. Moreover, the influx of Rohingyas into Bangladesh has negatively affected the local economy. For example, the Rohingya day laborers charge half of the money charged by local Bangladeshis, which has made the locals insecure of the presence of Rohingya refugees. The presence of the Rohingya community has also affected the environment of the Ukhia and Teknaf region of Bangladesh. 793 ha of 1502 ha of the forested areas have been encroached by the Rohingya community. Moreover 3000-4000 acres of land has been cleared of green vegetation.³⁶ The locals thus have a feeling of uneasiness towards the Rohingya population. If a clear path towards resolving the crisis could not be found, it is possible that the existing social tension could turn into conflict.

The Rohingya camps have also become a hot-spot of crimes. At least 10 criminal gangs active in Rohingya Refugee camps, who regularly carry out murder, rape, and drug trafficking in the camps. According to local security officials, 70% of the drugs are stored in the refugee camps before being transported to elsewhere. These gangs play a significant role in the entire process. Apart from criminal outfits, ARSA is also active in the camps. Though their ties with terrorism is disputed, their criminal affiliation can not be ignored. The group has been accused of terrorizing local ordinary Rohingyas and also murdering prominent Rohingya leader Mohibullah.³⁷ The presence of ARSA in Rohingya camps is further confirmed by the arrest of the brother of ARSA chief from the Rohingya camp. The activities of a wide range of criminal and militant groups in the Rohingya camps have affected the security of locals and ordinary Rohingyas alike. The proximity of Rohingya camps to the border and sheer number of people has made it difficult for Bangladeshi security forces to provide security to these camps. This is the major reason for Bangladesh to shift refugees from mainland Bangladesh to Bhasanchar, where the safety and security of the Rohingyas can be ensured and the criminal networks could be kept at bay.

³⁶ Lailufar Yasmin and Sayeda Akther, "The locals and the Rohingyas: Trapped with an uncertain future", *Asian Journal of Comparative Politics*, vol 5, no. 2, 2020, p. 104-120.

³⁷ MD Rashid, "How Cross-Border Crime Ensnarers and Endangers Rohingya Refugees in Bangladesh", *The Diplomat*, 2021.

Concluding Remarks

The Rohingya issue has proven to be the greatest crisis Bangladesh has faced since the 1971 war. To manage a million refugees and threats associated with it have proven to be difficult for Bangladesh. However, the issue could not be resolved due to the lack of actions from the International community. In many ways, the international association of the Junta and strategic goods Myanmar provides to many powerful actors have allowed the country to avoid the burnt of international laws. The western sanctions were also comparatively mild which were mostly symbolic in nature. Though actively engaged in regular rhetoric, the Western powers failed to take comprehensive actions due to fears that it would push Myanmar completely into Beijing's orbit. Countries like India and China also have vested interest in the Country. Beijing is constructing the China-Myanmar Economic Corridor which would connect the country to Bay of Bengal, an essential strategic objective for the country. New Delhi has similar ambitions through the Kaladan project which seeks to connect North-East India with the Bay of Bengal. The Rohingyas are thus trapped in between the geopolitical game, that is prolonging the marginalization, sufferings, and statelessness.

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CRITICAL FACTORS IDENTIFICATION TO MERELY STUDY THE STAGNANCY OF MARINE FISHERIES PRODUCTION IN BANGLADESH

Afifat Khanam Ritika

Abstract

Bangladesh is a maritime country with enormous fisheries resources. Fisheries are among the most identified aquatic resources due to their export earnings and national animal protein options. This study aims to investigate the factors responsible for the stagnancy of the marine fish catch of Bangladesh during the last 20 years. It will allow the stakeholders to take proper action for sustainable production, exploration, and economic development of the country's marine sector. Literature reviews were done on several related works; quantitative data was obtained from the Ministry of Fisheries and Livestock (MoFL), Department of Fisheries (DoF), Bangladesh Bureau of Statistics (BBS) and also from different published documents and research works. In the last two decades, the annual fish production of Bangladesh has increased nearly two and a half folds. A significant amount of total production comes from inland aquaculture, and statistics show no significant advancement of marine fisheries contribution with time (in the last two decades). Although a long time has passed, marine fisheries are still in the same position. This study has identified and explained the factors responsible for the static status of marine fisheries production in Bangladesh that will ultimately help the stakeholders give more attention to the advancement of marine fisheries sector to boost up its economy.

Keywords: Fisheries, Production, Stagnancy, Fishing Methods, Sustainability, MPA, MSP, IUU Fishing

Introduction

After the successful demarcation of maritime boundary, Bangladesh's maritime area has been extended by 118,813 sq km comprising 12 nm of Territorial Sea and an EEZ extending up to 200 nm into the high Sea.¹ The Bay of Bengal

¹ MoFA, "Press release: Press statement of the Honorable Foreign Minister on the verdict of the arbitral", 2014, Available at: <http://www.mofa.gov.bd/PressRelease/PRDetails.php?txtUserId=&PRid=85>.

(BoB) is one of the 64 Largest Marine Ecosystems in the world² and has reasonably productive environment.³ It is mixed with a warm tropical climate and high rainfall. Nutrients come from the land and the rivers of the Ganges, Brahmaputra.⁴ The rich ecosystem of the Bay of Bengal supports 1093 marine aquatic organisms, where 44.35% are finfish, 32.23% shellfish, 15.10% seaweeds, and only 8.32% are other organisms, including shrimp for Bangladesh.⁵ The details in a number of species and their percentages are shown in Table 1.

SL	Group of the Organisms	Nos. of Species	Percentage (%)
1	Bony Fish	486	44.35
2	Shark, Ray, Skate and Dolphin	21	1.92
3	Shrimp	36	3.30
4	Lobster	06	2.01
5	Crab	16	
6	Sea Turtle	03	0.27
7	Crocodile	03	0.27
8	Squid and Cuttle	07	0.64
9	Shellfish	350	32.23
10	Seaweed	165	15.10
Total		1093	100

Table 1: Statistics on MDF of Bangladesh⁶

After the peaceful demarcation of maritime boundary with Myanmar and India in 2012 and 2014, "Blue Economy" activities started in Bangladesh.⁷ MoFL

² Bay of Bengal Large Marine Ecosystem (BOBLME), "Status of Marine Protected Areas and Fish Refugia in the Bay of Bengal Large Marine Ecosystem", 2011, Available at: <https://www.boblme.org/documentRepository/BOBLME-2011-Ecology-10.pdf>.

³ P. Kumar, P.M. Muraleedharan, P. Thoppil and M. Gauns, "Biogeochemical of the Bay of Bengal: Physical, chemical and primary productivity characteristics of the central and western Bay of Bengal during summer monsoon", *Advanced Earth and Space Science*, vol 29, no. 24, 2018, p. 881-896, DOI: <http://dx.doi.org/10.1029/2002GL016013>; Available at: www.boblme.org & library.enaca.org.

⁴ Md. Shahadat Hossain, "Biological aspects of the coastal and marine environment of Bangladesh Ocean & Coastal Management", vol 44, no. 3-4, 2001, p. 261-28, DOI: [http://dx.doi.org/10.1016/S0964-5691\(01\)00049-7](http://dx.doi.org/10.1016/S0964-5691(01)00049-7).

⁵ Humayun Kabir, "Marine Fisheries in Bangladesh An Overview", 2006, Available at: http://library.enaca.org/NACAPublications/MaricultureWorkshop/MaricultureWS2006_Bangladesh.pdf.

⁶ Available at: <http://fisheries.portal.gov.bd/>.

⁷ Dr. Md Nazmus Sadekin, "Potentials of Blue Economy in Bangladesh", Green Fiscal Policy Network, 12 August 2021, Available at : <https://greenfiscalspolicy.org/potentials-of-blue-economy-in-bangladesh/>.

has identified 26 sectors for economic development from the blue ocean. Marine Fisheries is the most productive, dynamic and already partially developed area out of 26 sectors identified by MoFL with an immense prospect for future development and present scope of contribution in the agrarian economy of Bangladesh. The term fishing is commonly used for the exploration of all marine aquatic organisms having commercial importance includes crustaceans (such as crabs, lobsters, and shrimps), molluscs (such as squids, octopi, cuttlefish, and snails), echinoderms (such as starfish, sea urchins, and sea cucumbers), and other invertebrates.⁸ The marine fisheries sector contributes directly to the country's food and nutrition security and economy through significant income, employment and foreign exchange. The activity accounts for 4.4% of the national GDP and supports ~22% of the agricultural GDP.⁹ Marine fish contributes at least 20% of the country's total fish production. The annual catch from the Bay of Bengal was 0.67 million MT in 2019-20.¹⁰ The possible estimated catch from the Bay of Bengal is around 08 million MT. If we see the marine fish production trend of the last 20 years (Figure 1), the production is more or less similar or stagnant in the last two decades. There has been no significant advancement in the last 20 years in marine fish production.

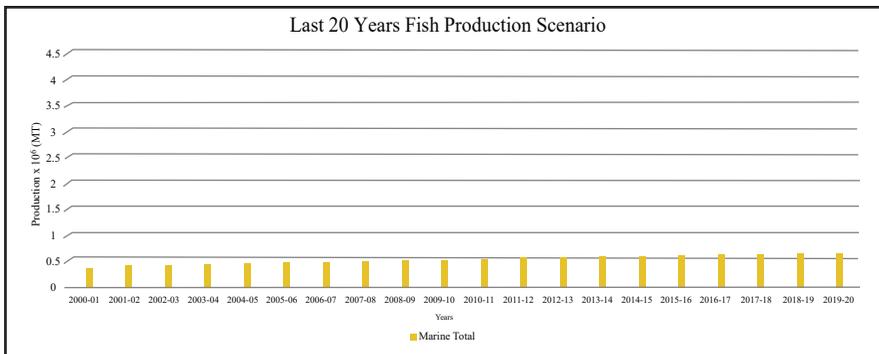


Figure 1: Last 20 Years, the Marine Fish Production Scenario¹¹

⁸ National Intelligence Council, “Global Implications of Illegal, Unreported, and Unregulated (IUU) Fishing”, 2016.

⁹ The World Bank, “Agriculture, forestry, and fishing, value added (% of GDP)”, Available at: <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS>.

¹⁰ Department of Fisheries (DoF), “Yearbook of Fisheries Statistics of Bangladesh 2019-2020”, Dhaka, Director General: DoF, 2020.

¹¹ Ibid.

Considering the sector-wise fisheries production in the last two decades, the inland fisheries growth rate in 2018-19 was 2.83%, the inland aquaculture growth rate was 3.46%. In contrast, the marine production growth rate was only 0.80% (Table 02).¹² Significant progress in the aquaculture sector has been made because of continuous research and technological advancement.¹³ But having a sizeable maritime boundary, Bangladesh is still with abysmal marine production.

Sector of Fisheries	Group of the Organisms							Growth Rate % (2018-19)	
	1993-84	1993-94	2003-04	2013-14	2015-16	2016-17	2017-18		2018-19
A. Inland Fisheries									
Inland Fisheries Total(A)	588620	837566	1646819	2952730	3251796	3496958	3621954	3724310	2.83
B. Marine Fisheries									
Industrial (Trawler Fishing)	14500	12454	32606	76885	105348	108479	120087	107236	(-)10.70
Artisanal	150382	240590	422601	518500	521180	528997	534600	552675	3.38
Marine Fisheries Total(B)	164882	253044	455207	595385	626528	637476	654687	659911	0.80
Total Fish Production (A+B)	753502	1090610	2102026	3548115	3878324	4134434	4276641	4384221	2.52

Table 2: Sector-Wise Fish Production Trend of Last Two Decades (Year Book of Agricultural Statistics, 2020)¹⁴

Bangladesh is a densely populated small country. With 148,460 km² area, Bangladesh supports almost 170 million people. On the contrary, not the whole area, only the land area 14.4 million hectares supports this huge population whereas per capita land is 25 decimal, out of which only 15 decimal is arable.¹⁵ The availability of per capita land is decreasing with the bursting growth of the population. Over time the land area is decreasing due to many developmental activities. Every day, about 225 hectares of land are reducing due to urban sprawl.¹⁶

¹² Available at: <http://fisheries.portal.gov.bd/>.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ A.n.m. Nurul Haque, "Shrinking of Arable Land", daily sun, 11 April 2017, Available at: <https://www.daily-sun.com/printversion/details/218720/Shrinking-of-Arable-Land>.

¹⁶ Ibid.

There are so many statistics presenting that the country is losing its cultivable land and land based production day by day. For a densely populated country like Bangladesh, agriculture is our primary source of food and nutrition. But expert believes that as day by day land is decreasing to feed the future generation, there is no alternative to explore and exploit the sea resources. Sea is a blessing for the country as a home for many living and non-living valuable resources. If we earn marine fish sufficiently, that could minimize the dependency on land for animal protein and green vegetables.

Leading to achieving the 2030 Agenda, its Sustainable Development Goal (SDG-14), and sustainable graduation from the least developed countries (LDCs) category marine fisheries can play a vital role.¹⁷ So, emphasizing the country's economic growth, marine earning for livelihood sustainability, and supporting the future generation, the paper has been designed to identify the possible factors responsible for the stagnancy of marine products in the last twenty years. The paper aims to identify the pathway for future improvement of marine catch, considering its present hindrance.

Factors Identification for Production Stagnancy and Analysis to Improve or Discussion

1. Traditional and Undeveloped Fishing Method

According to the BoBLME project, it is possible to catch 8.0 million MT of fish from the BoB.¹⁸ But compared to that estimation, Bangladesh caught about 0.65 million MT, which is only 8.1 % of that possible catch. Though we have a huge fishing area in the Bay of Bengal, the rate of fishing vessels is comparatively very low in our country, which is only about 67924 in number (Table 3), including shrimp trawlers, fish trawlers, mechanized and non-mechanized boats.

¹⁷ UN, “Sustainable development Goal Report 2020”, Available at: <https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf>.

¹⁸ BFRI, “Sustainable Management of Fisheries Resources of the Bay of Bengal”, Sustainable Management of the BOBLME Project, Available at: <https://www.boblme.org/documentRepository/BOB%20Bangladesh%20Report.pdf>.

Trawler		Boat		Gear	
Type	No.	Type	No.	Type	No.
Shrimp Trawler	37	MB (Mechanized Boat)	32859	Gill Net	118353
Fish Trawler	218	NMB (Non-Mechanized Boat)	34810	Set Bag Net	42429
				Long Line	11863
				Trammel Net	422
				Other Gear	15640
Total	255		67669		188707

Table 3: Different Gear Numbers Used in Marine Fishing¹⁹

During the last 15 years, those fishing vessels' size and engine capacity have increased very poorly and not much noticeable. The activities of those vessels have been minimal till now. Among those fishing vessels, a very few vessels are involved in deep-sea fishing, which is not even mentionable. Current fishing practices are carried out with smaller tonnage vessels (e.g. <20 m length, <1000 HP, <250 GT), usually, the size of larger boats is 25-28 meters in length, but 80% of our fishing boats are 5-10 meter and selective gears.²⁰ This is substantially limiting the scope of fishing across the geographic extent, i.e. specifically restricting the harvest of deep-sea and distant water fishery resources occurring at depth >80 m and distance >170 km. It is, therefore, necessary to develop the capacity to venture into distant and deep water fishing with high-tonnage vessels (e.g. >50 m, length, >2000 HP, >500 GT) using gears such as tuna long-lines and hooks (e.g. long liner 30-50 nautical mile, 1000-2000 hooks).²¹

The artisanal fisheries contribute about 92% of the total marine catch. Most of the boats used for pelagic fishing are wooden and steel-hulled and up to 15 years old. So, regular fishing has greatly been hampered by these traditional and low capacity vessels and resulting in poor harvest from the sea though we have ample natural resources.

Though the marine catch has increased slowly over time compared to

¹⁹ Available at: <http://fisheries.portal.gov.bd/>.

²⁰ Available at: https://en.wikipedia.org/wiki/Fishing_vessel.

²¹ M. S. Hossain, S. R Chowdhury and S. Sharifuzzaman, (eds.), "Blue economic development in Bangladesh: A policy guide for marine fisheries and aquaculture", 2017, Available at: https://www.researchgate.net/publication/319454363_Blue_economic_development_in_Bangladesh_A_policy_guide_for_marine_fisheries_and_aquaculture.

aquaculture, the sector-wise contribution sharing of marine fisheries' is the same in percentage over the last 30 years. This is because of traditional, low capacity and undeveloped technology use in marine sectors.

Bangladesh's standard marine fisheries items are Hilsa, Prawn, Sardine, Bombay Duck, Indian Salmon, Pomfret, Jewfish, Catfish, Shark/ Skate/ Ray and most of the catches are from artisanal fisheries limited to Hilsa, Shrimp and Sardine trawling (Table 4).

Type of Fishing	Shrimp (A)	Hilsa (B)	Group of the Organisms									Grand Total (A+B+C)	
			Sardine	Bombay duck	Indian Salmon	Pomfret	Jew Fish	Cat Fish	Shark/ Skate/ Ray	Other Marine Fish	Total (C)		
A. Industrial													
Trawl Fishing	2733	12300	27421	2656	0	849	5020	3010	724	52523	92203	107236	
C. Artisanal													
1. Gill Net Fishing													
a) Mechanized	0	254140	790	5085	245	2550	25550	2160	1930	30235	68545	322685	
b) Non-Mechanized	0	23876	0	55	0	145	1850	100	30	19305	21485	45361	
SUB-TOTAL	0	278016	790	5140	245	2695	27400	2260	1960	49540	90030	368046	
2. Set Bag Net Fishing													
a) Seasonal	37146	0	25	59945	0	7400	2925	40	110	49860	120305	157451	
b) All Seasonal	855	0	0	180	0	60	0	20	20	165	445	1300	
SUB-TOTAL	38001	0	25	60125	0	7460	2925	60	130	50025	120750	158751	
3. Long Line Fishing													
a) Jew Fish Long Line													
i. Mechanized	0	0	0	0	40	0	3750	5450	1405	6853	17498	17498	
ii. Non-Mechanized	0	0	0	0	10	0	145	110	35	150	450	450	
b) Other Long Line	0	0	0	0	0	0	60	40	20	35	155	155	
SUB-TOTAL	0	0	0	0	50	0	3955	5600	1460	7038	18103	18103	
4. Trammel Net Fishing	1015	0	0	30	0	0	1295	420	0	1485	3230	4245	
5. Other Gears' Fishing	1000	0	20	150	0	0	1005	105	0	1250	2530	3530	
TOTAL ARTISANAL	40016	278016	835	65445	295	10155	36580	8445	3550	109338	234643	552675	
GRAND TOTAL (Industrial+Artisanal)	42749	290316	28256	68101	295	11004	41600	11455	4274	161861	326846	659911	
%	6.48	43.99	4.28	10.32	0.04	1.67	6.30	1.74	0.65	24.53	49.53	100.00	

Table 4: Species-Wise Catch of Marine Fisheries in 2018-19²²

Bangladesh's fishing zone is limited to 40-60 meter depth due to the lack of appropriate fishing gear and fishing boats as almost all are smaller in size with no modern facilities.

²² Department of Fisheries (DoF), "Yearbook of Fisheries Statistics of Bangladesh 2018-2019", Director General, Dhaka: DoF, 2019.

If we consider our littorals, 148 deep-sea fishing vessels operate from India; China has a distant-water fishing fleet of about 26,00 which is more than the USA as it has a distant-water fishing fleet of only 300 in number. Bangladesh Government has taken a 'Pilot Project for Extraction of Tuna and Similar Pelagic Fish in the Deep Sea'. The target is to buy some deep-sea fishing vessels from this project. Training and Capacity Development of the sea going fisher to enhance production and extend the fishing horizon with advanced technology is an essential and timely need for Bangladesh.

2. Lack of Data on Stock Assessment

Since 1958, many studies and surveys have been done on stock assessment scope identification on marine fisheries in Bangladesh.²³ The crucial one was the UNSF/PAK-22 Project conducted by BFDC in collaboration with FAO/UNDP within 1968 to 1971 time period.²⁴ The project kept in account for an area of 26,000 km², and the main four fishing grounds resulted from that project.

Shrimp is one of the largest export items of Bangladesh. Many reports have been concluded with the stock assessment of Penaeid shrimp but the values are showing dissimilarities ranging between 1000 and 9000 ton. Some authors reported that the Penaeid shrimp stock range is 2000–4000 ton.²⁵ Khan et al. reported the Maximum Sustainable Yield (MSY) of shrimp within 7000–8000 t up to a 10 m depth. So there is a significant mismatch among data.

Several stock assessment surveys in BoB have been conducted between the 1970s and 1980s. After a prolonged pause since 1999, the marine fisheries exploration survey within the Bay of Bengal (BoB) started with the recently acquired R.V. Meen Sandhani equipped with an ultramodern laboratory and a sonar system able of detecting objects up to a depth of 1,600 metres in 2016. A complete survey will take three years, said a fisheries department functionary. According to the last report, the Survey vessel identified 457 ocean creatures in the

²³ Md. Shahhidul Islam, "Perspectives of the coastal and marine fisheries of the Bay of Bengal, Bangladesh", *Ocean & Coastal Management*, vol 46, 2003, p. 763–796, DOI: 10.1016/S0964-5691(03)00064-4.

²⁴ Bay of Bengal Program, "Marine Small-Scale Fisheries of Bangladesh: A General Description", Available at: <https://www.fao.org/fishery/docs/CDrom/bobp/cd1/Bobp/Publns/Inf/008.pdf>.

²⁵ Md. Shahhidul Islam, "Perspectives of the coastal and marine fisheries of the Bay of Bengal, Bangladesh", *Ocean & Coastal Management*, vol 46, 2003, p. 763–796, DOI: 10.1016/S0964-5691(03)00064-4.

Bay of Bengal. 373 fishes, 24 shrimps, 21 sharks and rays, 21 crabs, 5 cuttlefishes, 5 squids, 4 octopuses, 3 lobsters, and 1 squilla have been identified till now.²⁶

Fish stock assessments help the authorities with sufficient information for sound and sustainable management opportunities. NOAA Fisheries' scientific stock assessment is a standard one for fisheries management.²⁷ Through the size of fish stock, predictions about how a fish stock will respond to current and future management measures, identifying the factors influencing the past and present stock, determination of catch per unit effort, carrying capacity and the maximum economic yield for that stock are easily possible. Stock assessments provide essential scientific valuable information for the conservation and management of fish stock. When stakeholders and policymakers get enough information on stocks, it helps boost production through proper management strategy for sustainable growth and fishers will go for target fishing with economic sustainability.

In the last 25 years no established data collection and management system has been developed for marine fisheries in Bangladesh to interpret the actual stock. Mostly stakeholders use fishery dependent data recorded via logbooks and vessel trip reports, on-board observers, landing records, port sampling or dockside surveys, point of the first sale, telephone surveys or experiential knowledge, and record the data for survey or further use.²⁸

For sustainable management and flourishing of the marine fisheries sector, immediate data availability is very important. We can go for advanced technology that may use sensor and video recording where the collected data will be directly sent to the network system. Through satellite communication the related authority will store, synthesize or preserve the data for the suitable management authority.²⁹

²⁶ The Business Standard, "Survey vessel finds 457 sea creatures in the Bay of Bengal: Minister", 30 November 2021, Available at: <https://www.tbsnews.net/tags/rv-meen-sandhani>.

²⁷ NOAA, "Fish Stock Assessment 101 Series: Part 1—Data Required for Assessing U.S. Fish Stocks," 23 May 2012, Available at: <https://www.fisheries.noaa.gov/feature-story/fish-stock-assessment-101-series-part-1-data-required->.

²⁸ Alexia C. Morgan and George H. Burgess, "Fishery-dependent sampling: total catch, effort and catch composition".

²⁹ Afifat Khanam Ritika, "Opportunities to Improve Fisheries Management through Innovative Technology and Advanced Data Systems into the Bay of Bengal", Agri News24, 10 March 2021, Available at: <https://www.agrinews24.com/opportunities-to-improve-fisheries-management-through-innovative-technology-and-advanced-data-systems-into-the-bay-of-bengal/>.

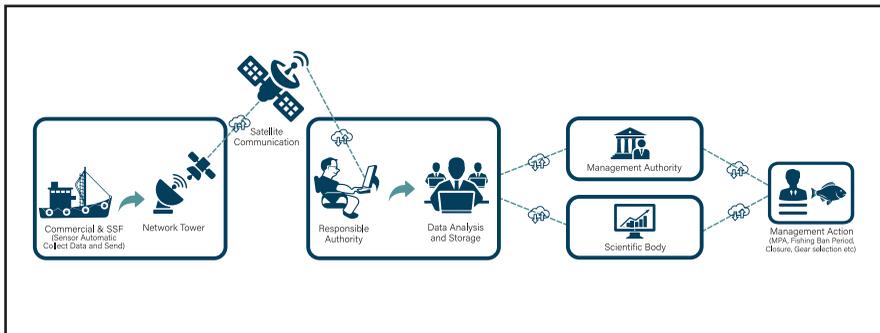


Figure 2: High Tech System for Fishery Dependent Data Collection³⁰

3. Overexploitation from the Limited Horizon, bycatch Activities and Stock Depletion

From 1985-86 to 1999-2000 the total number of engaged trawlers were 14. The number increased to 31 at the beginning of 2000-01 to 2009-10, sharply increased to 152 in 2012-13³¹ and in 2019-2020 the total number of trawlers is 255.³² The basic category of Bangladeshi sea-going vessels involved in trawling is mainly wooden body and steel hull types. The steel hull trawler is more efficient than wooden made. The Catch Per Unit Effort (CPUE) of steel hull trawlers is almost 4 to 6 times greater than that of wooden body trawlers.³³

Super trawlers are also found in the sea area of Bangladesh, which is mainly a threat to the marine ecosystem and biodiversity at present. Having the

³⁰ Afifat Khanam Ritika, "Opportunities to Improve Fisheries Management through Innovative Technology and Advanced Data Systems into the Bay of Bengal", Agri News24, 10 March 2021, Available at: <https://www.agrinews24.com/opportunities-to-improve-fisheries-management-through-innovative-technology-and-advanced-data-systems-into-the-bay-of-bengal/>.

³¹ S. Barua, E. Karim and Md. Humayun, "Present status and species composition of commercially important finfish in landed trawl catch from Bangladesh marine waters", International Journal of Pure and Applied Zoology, vol 2, no. 3, 2014, Available at: <https://www.alliedacademies.org/abstract/present-status-and-species-composition-of-commercially-important-fish-in-landed-trawl-catch-from-bangladesh-marine-waters-3551.html>.

³² Department of Fisheries (DoF), "Yearbook of Fisheries Statistics of Bangladesh 2019-2020", Dhaka, Director General: DoF, 2020.

³³ S. B. Ehsanul K, Md. H. Nasiruddin, "Present Status And Species Composition Of Commercially Important Finfish In Landed Trawl Catch From Bangladesh Marine Waters", International Journal of Pure and Applied Zoology, vol: 2, no. 2, 2014, p. 150-159.

double capacity of the existing industrial vessels' size and engine power makes them quick enough to catch the fast-moving pelagic fishes. They are fitted with sonar equipment to help them locate the fish schools. Four of these vast vessels arrived in Chittagong from abroad in 2019.³⁴ International monitoring organizations 'Ocean Mind' and 'International Justice Mission (IJM)' have been following the super trawlers since 2018 and confirmed through satellite imagery, the presence of both vessels in Chittagong port.³⁵ If such illegal vessels enter into Bangladeshi waters without any registration obstacles, Bangladesh is not so far to be a haven for the blacklisted vessels.

Intense exploitation with high fishing efforts in a limited horizon is the present trend for Bangladesh, and also, bycatch is so common. However, recent declining trends of commercial trawlers' CPUE indicate an alarmingly dwindling stock. The overall total (catch) seems to be increasing in the short run, which might be correlated to an increased number of vessels in operation and the use of underwater fish finder technology.³⁶

If the fishing horizon cannot be extended soon in a sustainable management strategy, overfishing and fishing bycatch cannot be stopped; it is not so far that over exploitation for the livelihood within the limited zone with the use of destructive and intense fishing methods will sharply decline the fish stocks under Bangladesh fisher's catch capability zones. That will bring an enormous loss for the overall ecosystem and fishers' economic status. The catch status of the marine fish stocks has remained more or less the same since the early 1990s.³⁷ Recent information suggests that among the significant fish stocks, only the 33/34 species are caught regularly, whereas the almost 250 species are untouched. There is a huge lacking of scientific and practical knowledge on fish biology and genetics. The overfishing of limited species from the limited zone is responsible for the reduction of catch rate in Bangladesh.

³⁴ Ocean Mind, "Bangladesh Overfishing", Available at: <https://www.oceanmind.global/insights/bangladesh-overfishing/>.

³⁵ Abul Kalam Azad and Charlotte Pamment, "Bangladesh overfishing: Almost all species pushed to the brink", BBC Bengali, 16 April 2020, Available at: <https://www.bbc.com/news/world-asia-52227735>.

³⁶ S. M. Sharifuzzaman, M. I. Golder and M. S. Hossain, "Augmenting Marine Food Production Through Fisheries Management and Mariculture," *Journal of Ocean and Coastal Economics*, vol. 6. no. 2, 2019, DOI: <https://doi.org/10.15351/2373-8456.1098>.

³⁷ Md. Shahhidul Islam, "Perspectives of the coastal and marine fisheries of the Bay of Bengal, Bangladesh", *Ocean & Coastal Management*, vol 46, 2003, p. 763–796, DOI: [10.1016/S0964-5691\(03\)00064-4](https://doi.org/10.1016/S0964-5691(03)00064-4).

4. Lack of Information on Marine Fish Ecology, Biology and Genetics

Sometimes deep-sea fishes (pelagic tuna/ Scombridae, mackerel, Indian salmon/ Polynemidae, etc.) are found in the offshore catch history of the fishers despite their habitation in deeper areas.³⁸ This is maybe due to their behavioural changes or ecological attitudes. So, knowing the life cycle of the commercial essential fish species is very important for sustainable and cost-effective exploration.

In addition, habitats across the lifecycle of valuable species need to identify for choosing the right fishing season and allow sufficient time for recruiting stocks. In connection to this, analyses of hydro-meteorological, biological, oceanographic and bathymetric data are necessary to identify the distribution of valuable species.³⁹

However, stock assessment reports can provide updated life histories, biology and ecology for every species.⁴⁰ In coordination with stock data, species profiles need to develop not only for the management but also to identify the catch area about their behavioral distribution. It will also help to target catch without harassing the fishers.

5. IUU Fishing and Piracy

IUU fishing is another common factor for the low catch in the Bay of Bengal region, especially for the Bangladesh. No countries are enough to address the incidents and management options of IUU fishing. Among the Bay of Bengal littorals, Bangladesh is mainly under the threat of IUU fishing due to a lack of legal and administrative monitoring and surveillance mechanisms.

There is no standard regional policy to address IUU fishing and its management tricks. There should have harmony. Due to a lack of combination on management strategy, the Bangladesh Coast Guard arrested over 519 Indian

³⁸ Available at: www.plancomm.gov.bd.

³⁹ Mohammad Rokanuzzamanm and Dilruba Chowdhury, "Blue Economy Prospects and Challenges of Marine Fisheries of Bangladesh", Academic Press and Publishers Library (APPL), 2018, p.79-117, Available at: https://www.researchgate.net/publication/338035302_A_SWOL_Analysis_of_Deep-Sea_Fishing_of_Bangladesh.

⁴⁰ "Many stock assessments use statistical surveys as an index of biomass, and shifts in distribution may move a stock partially outside the survey footprint such that the survey index is no longer correlated in the same way to population biomass," Predicting Future Oceans, 2019, Available at: <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/stock-assessment>.

fishers and seized 32 boats off the coast in Patuakhali, more than 125 km inside the Bangladesh EEZ, in 2019.⁴¹ This occurred during the 65-day ban period on marine fishing imposed by Bangladesh. It indicates the proportion of poor regional cooperation and management synchrony.

IUU fishing is highly detrimental not only for the livelihood of the coastal but also for the overall ecosystem. Still, there is no accurate estimated record of IUU fishing activities in the Bay of Bengal. There is a clear gap in the existing marine resource protection law of Bangladesh.

Bangladesh's Department of Fisheries (DoF) is the main governing body to continue duty regarding the sustainable management and exploitation of marine fisheries and the licensing of marine fishing in Bangladesh, which is under the Ministry of Fisheries and Livestock (MOFL). The head office of DoF is in Dhaka, including 13 coastal District Fisheries Officers out of the total 64 in numbers headed by District Fisheries Officers and 460 Sub-District Offices (Upazilla Offices) controlled by Upazilla Fisheries Officers (UFO).⁴² In addition to the DoF, at least 12 other government departments are involved in managing fisheries or their development.

DoF generally manages the marine fisheries by The Marine Fisheries Ordinance (1983) implemented by the Marine Fisheries Rules (1983). These rules contain many aspects, including vessel licensing, restrictions on fishing gear, and provisions for demarcating marine reserves. Different punishments for the violations of fisheries laws are also clearly stated there. The 'Protection and Conservation of Fish Act, 1950' as well as the 'Marine Fisheries Ordinance of 1983' address the necessity of conservation of inland and marine fish.⁴³ But with the time being the update of those laws and ordinances are important to address the threats properly.

⁴¹ Mohammad Arj, "Lines On Water Cannot Save Bay Of Bengal Fisheries", Go News Desk , Available at: <https://www.gonewsindia.com/latest-news/environment/lines-on-water-cannot-save-bay-of-bengal-fisheries-13333>.

⁴² T. J. Pitcher, G. Pramod and D. Kalikoski (eds), "An Estimation of Compliance of the Fisheries of Sri Lanka with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing", Fisheries Centre, University of British Columbia, 2006, p. 21.

⁴³ Mohammad Rubaiyat Rahman, "Analyzing the draft Bangladesh Maritime Zones Act", The Daily Star, 18 February 2020, Available at: <https://www.thedailystar.net/law-our-rights/news/analysing-the-draft-bangladesh-maritime-zones-act-1869532>.

Besides IUU fishing, piracy attack is another important reason for the depletion of coastal and marine fisheries production. In the first half of 2020, 51 incidents of piracy and armed robbery against ships were reported in Asia. This is almost two-fold in the total number of incidents reported in 2019.⁴⁴ The incidents mainly occur in Bangladesh, India, Indonesia, Philippines, Vietnam, South China Sea and Singapore Strait. These illegal activities are an uncontrolled threat in Bangladesh Jurisdiction and are responsible for production loss for the local anglers. Regular monitoring with properly addressing this unexpected event is very urgent at this moment. Regional management framework with fishing methods, vessel and gear control is another issue related to IUU fishing and ultimate loss of the local fisher of the coastal community of Bangladesh.

6. The Need for Maritime Spatial Planning (MSP)

The most commonly used definition of marine spatial planning was developed by the Intergovernmental Oceanographic Commission (IOC) of UNESCO:

“Marine spatial planning is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process. Characteristics of marine spatial planning include ecosystem-based, area-based, integrated, adaptive, strategic and participatory. Marine spatial planning is not an end in itself, but a practical way to create and establish a more rational use of marine space and the interactions among its uses, to balance demands for development with the need to protect the environment, and to deliver social and economic outcomes in an open and planned way”.

There are twenty ministries involving and performing sectorial management of marine living and non-living resources in Bangladesh.⁴⁵ Fishing is one of the oldest sectors in the maritime field in Bangladesh.⁴⁶ Therefore, this

⁴⁴ Riyaz ul Khaliq, “Piracy incidents in Asia almost double in 2020: Report 50 incidents of piracy, armed robbery recorded in Asia from January to June this year”, WORLD, ASIA-PACIFIC, 17 July, 2020, Available at: <https://www.aa.com.tr/en/asia-pacific/piracy-incidents-in-asia-almost-double-in-2020-report/1914005>.

⁴⁵ Mostafa Ali Reza Hossain, "An overview of the fisheries sector of Bangladesh", vol 1, 2014, p. 109-126, DOI: <http://dx.doi.org/10.3329/ralf.v1i1.22375>.

⁴⁶ P.G. Patil, J. Virdin, C.S. Colgan, M.G. Hussain, P. Failler and T. Vegh, "Toward a Blue Economy: A Pathway for Bangladesh's Sustainable Growth". World Bank, Washington, DC, 2018, DOI: <http://hdl.handle.net/10986/30014>.

provides major stakeholders involvement in the maritime area. However, new sectors, including oil and gas exploration, coastal tourism, salt production, and renewable energy, struggle to find their stake. The conflict with each other considering marine fisheries in the maritime area of Bangladesh is not new.⁴⁷ Fisheries are a primary economic sector for Bangladesh. The whole marine area is not equally important for each species. MSP helps to restrict the area necessary for fish and fisheries. Including other areas, the MSP approach has to be included in all aspects of marine fisheries, from commercial to recreational purposes.

MSP generally presents through a map where the area based resource distribution, their availability, human exploration area included. Bangladesh Government is now very much aware of sustainable ocean governance and development of MSP for SDG-14 to avoid the conflicts among different stakeholders as well. Bangladesh has a large marine area with many prospects, but the prime condition is to develop an MPS plan. If we see at the other maritime nations, they all have proper MSP for proper marine resource extraction and better marine ecosystem/environment management. Following to the approach or steps for MSP in other countries, it is not so challenging for Bangladesh to develop an MSP plan in the present situation, and it is also an urgent need. Bangladesh's government has developed a plan to turn Bangladesh into a developed country by 2040. Marine resources and the blue economy can play a vital role in this achievement. Following the others plan of the maritime nation, we could develop a plan for MSP according to their procedure, and a better management strategy could grab as soon as possible. Without proper information, management, and an economic settlement plan, no development is possible.

As Bangladesh is planning for MSP, the updated data and technological advancement should be considered for a fruitful MSP idea. It will help develop the marine sector, including others with proper guidelines and pathways. Without such strategic development, flourishing the fisheries is impossible with time advancement and populating growth.

7. Lack of Marine Protected Area (MPA)

As per existing national and international law and based on the available information, a maritime country should have a 10% Maritime Protected Area

⁴⁷ Md. Mostafa Shamsuzzaman and Mohammad Mahmudul Islam, "Analyzing the legal framework of marine living resources management in Bangladesh: Towards achieving sustainable development goal 14", *Marine Policy*, vol 87, 2018, P. 255–262, DOI: <https://doi.org/10.1016/j.marpol.2017.10.026>

whereas Bangladesh has only 4.7%. Recently St. Martins has been declared as a marine protected area.

St. Martin is the only coral island we have so far. It is a home for diverse marine life such as; 68 types of corals, 234 species of fishes, 5 species of dolphins, 151 species of algae, 191 species of molluscs, 40 species of crabs⁴⁸, etc. St. Martin is also the breeding ground for sea turtles.⁴⁹ It will protect the species and biodiversity and their future recruitment.

Promoting and protecting this tiny island may not seem to be a big deal, but the process will create new thinking within the community of Bangladesh. Due to the use of the destructive fishing method and gear, the stock is already under serious threat. To protect the future growth of marine species, their proper breeding and recruitment should have to be ensured through MPA declaration and proper management strategy development. Considering MPA, Sundarban, a marine biodiversity home, should be kept under special consideration. Without proper care, management and stock enhancement, the marine capture trend will never be significantly upward.

8. Lack of Mariculture Practice

Bangladesh has 150,000–180,000 ha fitting area for coastal aquaculture and a huge doable area for mariculture. Although shrimp farming is common in coastal areas, the production level is compliant nature-based dependency, increased disease outbreaks and mortality, poor water quality and unscientific use of inputs by farmers. Consequently, mud crab fattening (i.e. rearing of small wild crabs up to marketable size) in pens or cages, which gained attention recently, holds great promise if hatchery technology for artificial propagation and fry production can be guaranteed.⁵⁰

⁴⁸ Rajib Kanti Roy, "Sculpture with Plastic Waste at St Martin's Island: A beauty born out of beast," daily sun, 30 January 2022, Available at: <https://www.daily-sun.com/post/602549/Sculpture-with-Plastic-Waste-at-St-Martin%E2%80%99s-Island:-A-beauty-born-out-of-beast>.

⁴⁹ Nature Foundation St. Maarten, "Sea Turtles on St. Maarten", 8 May 2020, Available at: <https://naturefoundationsxm.org/portfolio/sea-turtles/>.

⁵⁰ BCS Admin Academy, "Economic and Development Prospects of Islands in the Bay of Bengal", Shahbag, Dhaka, 2018, Available at: https://www.academia.edu/38899189/Economic_and_Development_Prospects_of_Islands_in_the_Bay_of_Bengal.

Due to the demandable market price and consumer interest on crab species, it has come to the attention of the stakeholders.⁵¹ There are total 50 crab species available in the coastal and marine area of the Bay of Bengal, and 11 are solely marine. Only 3 species as *Scylla Serrata* (mud crab or mangrove crab), *Portunuspelagicus*, and *P. sanguinolentus* are commercially important.⁵²

Bangladesh found almost 133 seaweed species, and 8 of them are commercially important.⁵³ There are a lot of potentialities to expand the sector. Seaweed has great value in providing nutrition and medicinal utilization. Bangladesh should therefore promote the trend of seaweed culture and consumption practice among the people. Seaweeds are grown/culture in selected intertidal zones. Mass production techniques and marketing facilities should be developed.

There are also so many species that mariculture practice should adopt to avoid dependency on nature. Production intensification of already cultured fish or shrimp species and for the new species is important to make it economically sound. If we follow the same technique of inland aquaculture and give intensive concern to mariculture practice, it is possible to boost marine production sharply. Poor research capacity and facility in mariculture practice is also the main cause of marine production stagnancy in Bangladesh over time.

9. Pollution and Climate Change

The Bay of Bengal contributes nearly 4% of the global catch.⁵⁴ But the Bay is heavily littered with different types of pollutants, and vast amounts of plastic waste are found on the surface and bottom area. So many factors are responsible for fish degradation in rivers resulting in seawater pollution.⁵⁵ Every

⁵¹ Nipa Chaki, "Culture of Mud Crab, *Scylla serrata*", Bd FISH Feature, Available at: <https://en.bdfish.org/2011/02/culture-mud-crab-scylla-serrata/>.

⁵² Ibid.

⁵³ Near Ahmed and Wara Taparhudee, "Seaweed Cultivation in Bangladesh: Problems and Potentials", Kasetsart University Fisheries Research Bulletin, 10 December 2005, Available at: https://www.researchgate.net/publication/261595838_Seaweed_Cultivation_in_Bangladesh_Problems_and_Potentials.

⁵⁴ FAO, "The State of World Fisheries and Aquaculture 2020", Sustainability in action, Rome, 2020, DOI: <https://doi.org/10.4060/ca9229en>.

⁵⁵ Md. Mostafa Shamsuzzaman, Mohammad Mahmudul Islam, Nusrat JahanTaniaa, Md. Abdullah Al-Mamun, Partho Protim Barman and Xiangmin Xu, "Fisheries resources of Bangladesh: Present status and future direction", Aquaculture and Fisheries, vol 2, no. 4, 2017, p. 145-156, DOI: <https://doi.org/10.1016/j.aaf.2017.03.006>.

day, 3 billion microplastic particles enter into the Bay of Bengal. Bangladesh alone contributes about 2 lakh tons/year of plastics into the Bay of Bengal.⁵⁶

Plastics directly impact organisms both through entanglement and ingestion, resulting in suffocation. It generally affects the food chain by producing harmful chemicals that affect the water's primary productivity. Bangladesh is the 10th most plastic polluting country globally.⁵⁷ Besides plastic pollution, Bangladesh is also the second country after India in terms of ship recycling volume. Most of the hazardous materials are directly dumped into the environment, leading to pollution in the marine environment. The pollutants have a direct impact on animals and environments. The new dead zone of the Bay of Bengal is now at a point of concern about pollution. Fish and other animals are at high health risk due to several pollutants added into the Sea regularly in an uncontrolled manner. Ship breaking yards dump about 22.5 tons/year of polychlorinated biphenyls. Urban activities are responsible for more than 50% of marine oil pollution.⁵⁸

Climate change is ultimately the long term effect of pollution. The production of CO₂ and other greenhouse gases from industries, transportation, electricity production sector, commercial and residential activities, agriculture, and deforestation result in climate change and global warming. A report published at the IUCN World Conservation Congress concluded that oceans have taken up 93 per cent of the warming created by humans since the 1970s.⁵⁹ That determines if the heat production between 1955 and 2010 had gone into the Earth's atmosphere instead of the oceans, temperatures would have reached by nearly 36.2°C.⁶⁰

⁵⁶ Mia Seppo, "Beat Plastic Pollution", The Daily Star, 5 June 2018.

⁵⁷ "Every day, three billion micro plastic particles enter the Bay of Bengal", Open Access Government, 22 January 2021, Available at: <https://www.openaccessgovernment.org/bay-of-bengal/102056/>.

⁵⁸ J. Biswas, MD. M. Haque and N Kalra, "Coastal and Marine Pollution in Bangladesh: Pathways, Hotspots and Adaptation Strategies", European Journal of Environment and Earth Sciences, vol 2, 2021, DOI: 10.24018/ejgeo.2021.2.4.133.

⁵⁹ Brittany Patterson, "How Much Heat Does the Ocean Trap? Robots Find Out", ClimateWire, 18 October 2016, Available at: <https://www.scientificamerican.com/article/how-much-heat-does-the-ocean-trap-robots-find-out/>.

⁶⁰ Ibid.

The COP 26 credibility gap and future of climate change document projected that, if all announced targets are implemented fully including net-zero emission target, long term targets and nationally determined contributions; the total global temperature increase will be 3°C or move with present manner temperature increase will be 3.9°C by 2100 from the pre-industrial period (Figure 3). So, there is clear evidence that we are at a high risk of climate change.

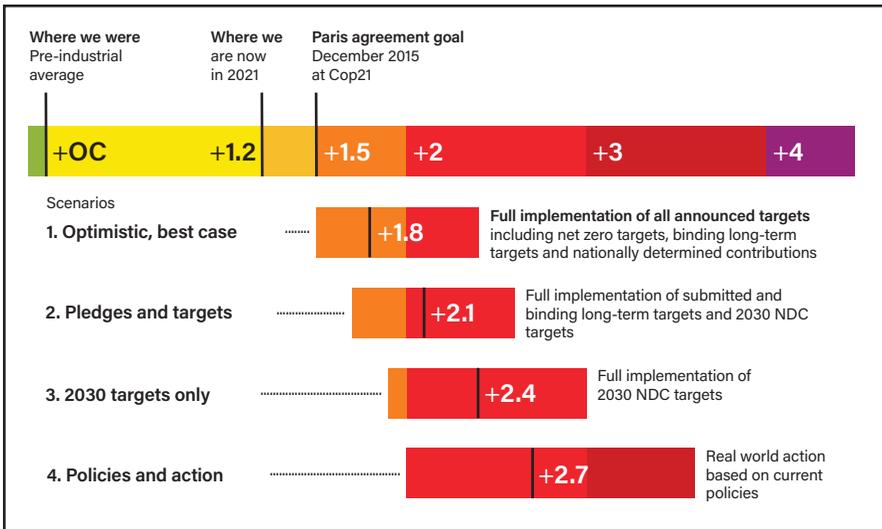


Figure 3: Climate Action Tracker, Warming Projections Global Update-November 2021⁶¹

The ocean is a home for many species. Climate change is the most significant global threat to marine ecosystems. It changes ocean chemistry and is responsible for sea-level rise, sea surface temperature, ocean heating, ocean acidification, coastal flooding, salinity intrusion, etc.

All those factors that occur due to climate change directly and indirectly impact commercially crucial marine biodiversity. Direct effects act on physiology and behavior and alter distribution, composition, growth, reproductive capacity, recruitment and mortality. Indirect effects mean the effect on the food web and habitat. Ocean heating, regular cyclone formation and other disaster destroy the

⁶¹ Climate Action Tracker, “Warming Projections Global Update November 2021”, November 2021, Available at: https://climateactiontracker.org/documents/997/CAT_2021-11-09_Briefing_Global.

feeding, breeding and nursery ground for fish and other commercially important species.

Due to pollution and climate change, fishes migrate or die. The shipping pressure on the water creates sound pollution and destroys breeding and hatching percentage. In the long-run production, deduction occurs in the environment. Though fishing gears have been increased in number, Bangladesh's catch trend for the last two decades may be the result of fish migration or species reduction.

Bangladesh Government has the vision to reduce climate change's impact on the coastal community and marine ecosystem. As a zero contributor with maximum risk holder Bangladesh should go for adaptation rather than mitigation measures. The Government of Bangladesh has developed Bangladesh Climate Change Strategy and Action Plan (BCCSAP), it has NAP for the community level management of the fisher community as well. As a direct fisheries conservation and protection strategy, more research should be carried out, more salinity tolerant species should be produced to combat impact. Many utilized or underutilized resources are available in the marine area that should be explored sustainably for economic growth and reimburse adaptation costs. To encourage the seagoing fisher by reducing climate change vulnerability more training and capacity building program should be arranged.

Along with local management strategy, regional cooperation in developing common rules and regulations to protect the BoB is an urgent need for the country.

Observation in Brief

All the mentioned above factors directly or indirectly impact marine catch. Production reduction is the ultimate result of low fishing capacity and low stock availability. With developing fishing capacity, advancing technology sustainability should be mentioned. Hampered in species recruitment and growth is the ultimate result of low catch. More knowledge sharing with the littorals and expansion of fishing activities in a sustainable way is the primary concern to feed the future generation.

General Recommendations and Conclusions

Although Bangladesh is participating in the global total marine catch significantly, there is a vast scope for improvement. The implementation of SDG 14 and its targets for sustainable growth and economy from fishery cannot have any prospect of success without expanding the marine catch substantially. Blue Economy is one of the topmost priorities for "Vision 2041", and marine fisheries are the most readily available and harvestable sector. Proper management, conservation, protection and exploration are the key factors in developing marine production and stretching the country's economy.

Natural stock enhancement, including cultural practice, is the ultimate goal for Bangladesh. Though many plans have been taken to improve marine production, many constraints regarding biological, social and economic aspects should be mentioned properly. Balanced participation of different related stakeholders, experts and academia should be encouraged to flourish the sector, the resources need to be managed and exploited on a sustainable basis. Regular monitoring and actual data collection are vital. Regional Common Fisheries Policy should develop for sustainable growth of these shared resources. However, technological advancement, control of pollution, adaptation strategy development against climate change and not least, people's awareness and perception of sustainable management, exploration and exploitation are sometimes even more important than the plan itself. Before any well-formulated plan and fishing effort with advanced technology, the fishers' ability should consider. There should be regular training and capacity building program; Government should be interested in more investment and develop learning opportunities from the neighboring countries on catching power and capability rate for further application.

Proper knowledge of the marine environment and biological cycle with stock data is vital to developing sustainable harvesting methods and techniques within the EEZ of Bangladesh. Regular monitoring of the catches and fishing efforts of industrial and artisanal marine fisheries and immediate data transfer system with regional networking is essential to avoid overfishing, IUU fishing, and piracy. Setting up proper and strict rules and their effective execution is critical to enhancing marine fish production. Over exploited species identification for their conservation, MPA declaration, expansion of fishing horizon from a limited area, deep-sea fishing capacity, monitoring bycatch and value-added product processing technology development are some of the immediate needs for enhancing the marine catch priority and demand for Bangladesh. Conflicting fishing practice, especially unplanned artisanal fishing pressure significantly reduces shrimp catch

rate and influence trawling operators to trawl in shallow water regions. The impact of destructive fishery is about 99% of the population does not get a chance to participate in the spawning process.⁶² Therefore, the scientists and related departments should understand the nature of the particular species and develop mariculture practices to reduce dependency on nature.⁶³ Responsible authorities should consciously consider the suggestions with valuable findings of the experts and support the research facilities and advancement facility adaptation from the littorals to have a significant production in the new century.

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⁶² Md. Shahidul Islam, "Perspectives of the coastal and marine fisheries of the Bay of Bengal, Bangladesh", *Ocean & Coastal Management*, vol 46, 2003, p. 763–796, DOI:10.1016/S0964-5691(03)00064-4.

⁶³ Secretariat of the Convention on Biological Diversity, "Solutions for sustainable mariculture - avoiding the adverse effects of mariculture on biological diversity (CBD Technical Series no. 12)", 2004.

A STRONGER SAFETY REGIME IS VITAL TO ENSURE SAFER PASSENGERS' MOVEMENT AT INLAND WATER TRANSPORTATION SECTOR OF RIVERINE BANGLADESH

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Abstract

Operators of passengers' vessels in the Inland Water Transportation (IWT) sector of riverine Bangladesh are being regularly challenged which results accidents of different magnitude with loss of valuable lives and properties. There have been very limited research works on accident related issues in the IWT sector which reveal the root causes. As a result, there is very slow or no improvement on safety standard at this sector. This study includes an assessment of the existing legal framework along with different technical snags that contribute in prevailing unsafe conditions of the passengers' vessels in the IWT sector. The research has been a mixed approach based on primary and secondary data. Apart from the study of available documents, qualitative and quantitative data have been collected from stakeholder groups in both the private and public sectors. At field levels key information have been gathered from accident prone areas in Bangladesh. By analysis of available information and data, this paper argues that the legal framework has limitation in certain major areas of governance along with technical matters which allow to build unsafe vessels in the IWT sector of Bangladesh. Finally, recommendations have been drawn to assist in strengthening the safety regime through building technically fit vessels, which need to be operated under appropriate management to ensure safer transportation in riverine Bangladesh.

Keywords: Safety, Passengers, Vessel, Legal Framework, Design and Construction

Introduction

Safety during operation of passengers' vessels in riverine Bangladesh has been a major concern over the years. This is vivid from recurring accidents of different magnitudes. Statistics on accidents and fatalities over a period of 20 years (2000-2020) are shown in Figure 1. It is seen from Figure 1 that there is not a single year without any accident in the sector. The frequency of accidents over the decade is not stable either. There are rise and fall in the total numbers. This

fluctuation may be due to various reasons like a degree of seriousness on how the authority took initiatives to warn the operators on weather as well as human activities from time to time. In the case of fatalities, it is observed that the number was higher in the years from 2000-2005 compared to the period from 2010 to 2015. This apparent lower number of fatalities may not speak that the safety situation has improved. It could be due to sporadic precautionary measures and occasional discontinuity of vessels' movement during inclement weather condition.

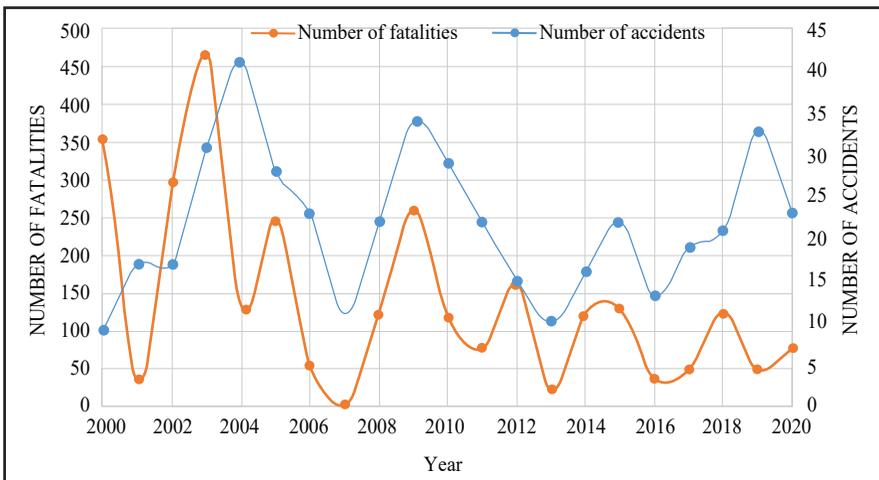


Figure 1: Year Wise Statistics of Riverine Accidents and Fatalities in Bangladesh

Information shown at Figure 1 are taken on the basis of the First Investigation Report (FIR) lodged in local police stations and cases filed in the marine court. Number of missing persons was not considered in many reports. A few recent accident cases reveal the fact that there still remains plenty of areas of concern regarding safety aspects of passengers, which demand stronger regime to improve the overall safety standard. Some of the major accidents on different occasions are summarized in Table 1.

SL	Date	Vessel	Location	Casualty
1	25th May 1986	MV SAMIA	The Meghna	600
2	20th August 1994	MV DINNER	The Meghna	300
3	11th December 1999	FERRY	The Meghna	63
4	3rd May 2002	MV SALAHUDDIN	The Meghna	370
5	8th July 2003	MV NASRIN	The Meghna	500+
6	17th November	MV COCO-4	The River Tentulia	75

7	12 March 2012	MV SHARIATPUR-1	The River Meghna	140
8	15 May 2014	MV MIRAJ-4	The River Meghna	200
9	29 June 2020	ML MORNING BIRD	The River Buriganga	32

Table 1: Summary of Major Accidents in Riverine Bangladesh.
Source: Department of Shipping (DoS)

Present study finds that some of the major accidents were not properly investigated by competent authority or if investigated, reports were not preserved well. It may be noted that when RMS Titanic sank on 15 April 1912 in the North Atlantic Ocean, the world maritime community had raised voice together. Subsequently, International Maritime Organization formed the first convention on Safety of Life at Sea (SOLAS) in 1914, the second in 1929, the third in 1948, and the fourth in 1960. Life is important both at sea and elsewhere. Author thinks that if this convention could have been named as Safety of Life on Water, situation could have been different now for IWT sector as well.

The trend of riverine accidents of different magnitude with casualties and loss of life over the last 45 years have been analyzed. The study was based on recorded data of 719 accident cases in the office of the Department of Shipping (DoS) of the Government of Bangladesh (GoB).

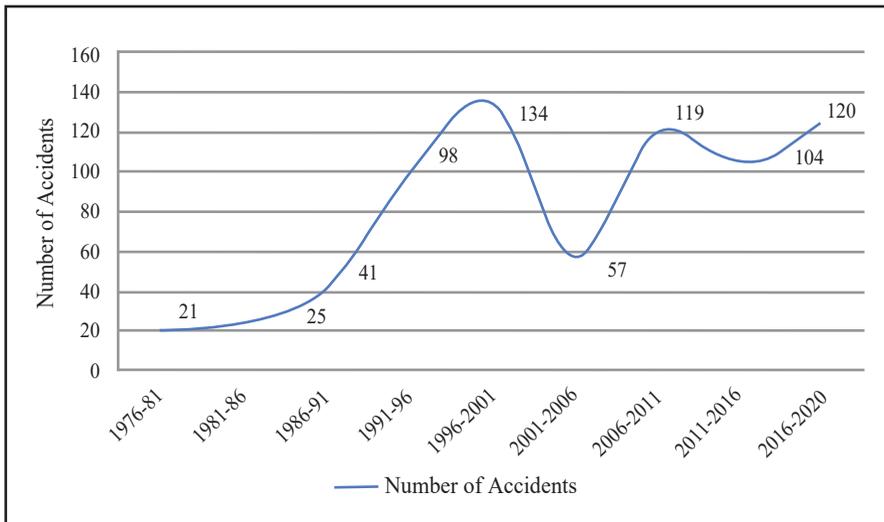


Figure 2: Number of IWT Accidents in 45 years, Source: DoS

The trend is seen at Figure 2. It is observed that there are two downward drifts during 1996-2002 and again in 2012-2020. The study of some accident

documents (one major accident is with ML PINAK 6, capsized on 14 May 2015)¹ also tells that that governance at IWT sector was not appropriate enough. It is also seen that the accident cases are not always thoroughly investigated using internationally recognized models to find the root causes. In most of the cases the important recommendations are also not implemented by the vessel owners properly and safety issues continue to exist in the system. Author noticed that there is no practice developed to publish the investigation reports for public in Bangladesh as is done in many developed countries. As a result, credibility of the investigation remains under question and root causes are hardly revealed. Operators of the IWT passengers' vessels continue to remain under challenge and overall safety standard tend to remain low.

In present study, primary data is taken through physical survey by the author himself at field, interviewing key informants from different groups of stakeholders, Focused Group Discussion (FGD) and taking experts' opinion during survey. Secondary data has been taken from relevant research findings, government and non-government offices, websites of both national and international organizations. As many as 12 stakeholders' groups have been involved. Majority of relevant data have been collected from Department of Shipping (DoS), Bangladesh Inland Water Transport Authority (BIWTA), Bangladesh Inland Water Transport Corporation (BIWTC), Survey offices of the government, office of the association of the owners and different national and international websites. At the field, simple random sampling has been done to collect data. Five accident prone areas i.e., Barisal, Patuakhali, Hatiya, Bhola and Mawa of the riverine Bangladesh have been under the study for a prolonged time between 2015-2019.

Literature Review

Quite a few research studies have been carried out where both local and international researchers have made valuable contributions. A few studies have been mentioned here.

Majority of the available research findings with statistical analysis mention about immediate causes of accidents to happen. Causes which have been identified by different researchers are: dangerous or improper overloading; collision during movement; foundering, bad weather; incident of fire; grounding

¹ Hossain, "PINAK- 6 sinks with hundreds of in the middle of the river the Padma", The daily Prothom Alo, 04 August 2015, p. 1.

etc.² A statistical analysis of the hazards involved with the indigenous technology-based marine vehicles in Bangladesh was featured extensively in a group study³ and revealed some interesting findings. Studies showed majority of accident cases at rivers of Bangladesh which happened over a period of 26 years (1981-2007) were due to collision but root causes were not identified. Out of 67 cases, vessels having a length within 40 to 60 metres fell more into accidents (44%), vessels 20 metres and below were the second-highest (27%), vessels of length from 20 to 40 metres were the third-highest (17%) and vessels of 60 metres and above were minimum (12%). This study also reveals loss of stability due to rushing of passengers, overloading, and grounding as the main causes of the accidents. The findings left ample chance to carry out further study about stability failures of poorly constructed vessels. A native researcher's comments published in the proceedings of the International Conference on Marine Technology MARTEC 2010⁴ which stated: 'Navigable waterways to be classified in both dry and monsoon season based not only on water depth but also on the sea state conditions clearly indicating the suitability of the type of vessels (especially passengers' vessels) plying at night'. It has not been mentioned about the areas which should come under sea state conditions. While discussing the type of open/closed type boats (sunken boats, 11/2 to double-decker), it has been stated that boats are designed and built without any international classification society's rule and putting the extra burden on operators. By studying available documents of investigations with the DoS, it is seen that legal actions are taken on many cases but due to slow judicial processes the victims are deprived of proper justice on many occasions. The defaulters are hardly taken into task and wrong practices are continued. Lawson, C. & Weisbrod, R. (2005),⁵ in the early part of the century made a comparative study in the fatality rates of a number of countries in the

² Z.I Awal, M.R Islam and M.M Hoque, "An Analysis of Passenger Vessel Accidents in the Inland Waterways of Bangladesh", Proceedings of the Marine Technology Conference 2006, University of Hasanuddin, Indonesia, 2006, p. 211-21.

³ Z.I Awal, "A Study on Inland Water Transport Accidents in Bangladesh: Experience of a Decade (1995-2005)", Proceedings of the International Conference on Coastal Ships and Inland Waterways, London, Royal Institution of Naval Architects (RINA), 2006, p. 67-72.

⁴ A Dev, "Sustainable Growth Inland Waterways of Bangladesh Through Innovation: A Way Forward", Proceedings of MARTEC 2010, The International Conference on Marine Technology, BUET, Dhaka, 11-12 December 2010, p. 45-52.

⁵ C Lawson and R Weisbrod, "Ferry Transport: The Realm of Responsibility for Ferry Disasters in Developing Nations", Journal of Public Transportation, vol 8, no. 4, 2005, p. 17-24. Available at: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.897.4167&rep=rep1&type=pdf>.

developing world. The study shows Bangladesh was one of the worst-hit countries, where accidents had occurred (Dec 2000 – May 2004) due to both natural and manmade reasons. Although the statistics are different after two decades, some of the main reasons have not altered. Major safety related issues are still in existence, which results frequent disastrous consequences in the river routes of Bangladesh. Huq et al. 2003⁶ attempted to trace out the causes of Launch Disasters and the geographical distribution in Bangladesh over a period of 23 years (1977-2000). The team studied 140 cases, and found that zone wise Barisal, Bhola, Patuakhali, Chandpur and Dhaka areas had 69.55% of accidents altogether. The root causes including legal aspects were not discussed.

Existing Legal Framework

Inland Shipping Ordinance (ISO) 1976⁷ is the main instrument for the survey, registration and control of navigation of vessels plying on inland waters. This was published in the Bangladesh Gazette, Extraordinary, on 21 September 1976 by the Government of the People's Republic of Bangladesh (Ministry of Law and Parliamentary Affairs). In pursuance of the proclamation of the 20th August 1975 and the 8th November 1975 and in the exercise of all powers enabling him in that behalf, the President promulgated the ordinance, which is called 'The Inland Shipping Ordinance 1976 (ISO-1976). As part of the ordinance, following regulations have been examined:

- a. Regulations for steel made vessels in 2001
- b. Inland Water Vessel (Passengers') Regulation, 2001
- c. Inland Water Vessel (Freeboard) Regulation, 2001
- d. Inland Water Vessel (Stability) Regulation, 2001
- e. Inland Water Vessel (lifesaving) Regulation, 2001
- f. Inland Water Vessel (Fire Safety) Regulation, 2001
- g. Inland Water Vessel Examination Curriculum (Inland Master, Driver etc.) Regulation, 2001
- h. Inland Water Vessel (Employment, Examination and Awarding Certificate) Regulation, 2001

⁶ N.A Huq and A.M Dewan, "Launch Disaster in Bangladesh: A Geographical Study", *Geografia*, vol 1, no. 2, 2003, p. 14-25. ISSN 0126-7000.

⁷ Ministry of Law, Available at: <http://bdlaws.minlaw.gov.bd/act-531/section-14712.html>, accessed on 29th December 2021.

- i. Inland Water Vessel (Minimum Safe Number of Crews) Regulation, 2001
- j. Inland Water vessel (Vessel Movement) Regulation, 2001

ISO 1076 has been modified until 15 March 2005 after incorporation of the following amendments:

- I. The Inland Shipping (Amendment) Ordinance, 1979 (Ord. NO. XIV of 1979)
- II. The Inland Shipping (Amendment) Ordinance, 1983 (ORD.NO.XI of 1983)
- III. The Inland Shipping (Amendment) Ordinance, 1989 (Ord.NO.XV of 1989)
- IV. The Inland Shipping (Amendment) Ordinance, 2005 (Act No.13 of 2005)

Observations and Analysis on Legal Instruments

From scrutiny of the existing laws, FGD with concerned experts on the legal matters and associated stakeholders, it reveals that safety related certain provisions in the ordinance need further review and amendment. Applicability of the rules for passengers' vessels has been ambiguous from safety point in view. The term "Passengers' Vessels" for IWT sector has been defined at Inland Shipping Ordinance (ISO) 1976 as a vessel carrying 12 or more passengers for revenue. Three categories of passenger vessels are operated at the IWT sector which include: Motor Vessel (MV) of length 65 feet or more having capacity of passengers 100-1500; Steel made Mechanized Launch (ML) of length below 65 feet having capacity of passengers below 100; and traditional wooden or steel made Mechanized Boat (MB) of smaller size. ISO 1976 is applicable to vessels carrying minimum 12 passengers having length 20 metres (65.6 feet) or more. Again, to have correct stability criteria, the rules (Chapter 2, Section 6) are applicable for vessels with size only for vessels above 24 metres, which is ambiguous. There are numerous passengers' vessels already registered and skip the criteria for stability requirements as per the existing rules. These are exposed to danger during any sort of inclement weather. Almost 70% stakeholders' representatives opined that regulatory framework is weak and need to be strengthened. Some of the major observations on the available Legal Instruments have been described.

a. **Builders of Vessels.** The law itself does not say anything about the ‘builders of boats and vessels’ who build ships/craft at random along the riversides. Due to the absence of guidelines in the laws and rules, anybody could attempt to raise a yard for repairing and building small to medium size watercraft at any place they find suitable without any formal permission of the government at the beginning. This is a limitation in the existing legal framework. Section 2 of Chapter -1 does not define the designers and builders of vessels and has no indication of the building yards and process of registration for the same.

b. **Category of Vessels.** These chapters I and II introduce basic elements of the laws regarding Inland Vessels in the context of Bangladesh. When these laws were initially drafted, the researcher deduces that it was the period when there were vessels propelled by steam, sail and paddlewheel power also. In the present-day context, steam-powered boats are not there in the IWT sector of the country. Time will not be far off when there would be battery-powered hybrid boats or solar powerboats also. It is thus inferred that provision for similar options may also be there in the laws.

c. **Duplication of Responsibilities.** Existing law does not clearly define areas of responsibilities of different stakeholder’s departments; as a result, there arise chances for overlapping /duplication of responsibilities.

d. **Offences and Subsequent Penalties.** As per ISO 1976, monetary penalties to the defaulters gradually lose importance with the devaluation of currency due to inflation. Again, frequent amendment of the laws and regulations dealing with pecuniary penalties is a very time-consuming process. Instead of currency, if penalty units are introduced, it may be a simpler and quicker method of adjustment of fees and charges. That is why Australian Maritime Safety Laws have a penalty in terms of units (a certain amount of Australian Dollar equal to one penalty unit) for any breaches of law in Australia at federal, state and territory levels. Section 4AA of the Crimes Act 1914 sets the monetary amount of a penalty unit, which is A\$210 as of 1 July 2017.⁸ This is a useful example for the local judiciary which may be implemented in Bangladesh. In that case, if the value of taka changes, the law may remain the same, and the value of penalty units need to be only declared based on socio-economic condition by the finance/treasury department.

⁸ AMSA, “Australian Government, Australian Maritime Safety Authority webpage”, 2020, Available at: <https://www.amsa.gov.au/vessels-operators/domestic-commercial-vessels/paying-infringement-penalty>.

e. **Standard Operating Procedure.** The administration, including the regulatory agencies, become helpless when the situation gets out of control, and eventually, they leave everything to the will of God for any untoward incidence to happen. Lack of Standard Operating Procedure and its implementation simultaneously appears to be a reason for major complications and problems experienced.

f. **Section-44(3) (Shipping Casualty and Report Thereof).** Upon receipt of the report of shipping casualty under sub-section (2) of upon receipt of any information from any reliable source the officer in charge of the police station shall as soon as possible, and in any case not later than twelve hours of the occurrence of the casualty, make a report in writing of the facts and circumstances of the casualty to the Government, Director-General, the District Magistrate and the Upazilla Nirbahi Officer within the limits of whose jurisdiction the casualty has occurred'. No indication of keeping or protecting the physical evidence. The rule also does not say who would investigate, as these are mostly technical matters that need an opinion from specialists/assessors qualified to conduct accident analysis. Absence of any neutral board to conduct investigation keeps scope that may lead to biased decisions. In this respect the National Transportation Safety Board (NTSB)⁹ of USA sets an example to carry out un-biased investigation for maritime accidents to find the root cause.

g. **Section-47(1) (Constitution of Marine Court and Legal Procedure to Lodge Cases).** There shall be constituted one or more Marine Courts consisting of a Magistrate of the first class to try the offences punishable under this Ordinance. Observations in relation to court, investigation, manning/certification and penalty related issues by Chapter of ISO 1976 are as follows:

(1) The number of the marine court has been mostly one, although there has been a provision to increase. (Chapter IV, Section-47). The section may mention when to open a second or subsequent Marine Court.

(2) Regarding keeping evidence of any accidents and casualties, the provision by master or owner, the provision in the rule/law is scanty. This has a deleterious effect in determining the root causes of any occurrence (Chapter IV, Section -48).

⁹ National Transportation Safety Board (NTSB), Available at: <https://www.nts.gov/investigations/Marine/Pages/default.aspx>.

(3) The investigation team does not need to have a member who is qualified to conduct maritime investigations with appropriate tools and knowledge; this may be a mandatory requirement. (Chapter IV, Section 45).

(4) Interview of Public Prosecutor and reputed lawyer of Supreme Court who is also involved in Marine court reveals that there are a number of instances of filing cases at two different courts, which complicate the situation and delay justice. There are records of stay order for a number of accident cases after some progression. Examples of cases are for accident cases of MV PINAK, MV MIRAJ, MV MOYUR, MV LIGHTING SUN, MV SHAROSH. In this respect home ministry of the Government of Bangladesh have clear instruction to the police department for handing over the cases to the marine court who have specialists to deal with the maritime related cases. On the other hand, local administration with police department take advantage of Section 45 and use Code of Criminal Procedure without having any competent specialized person with maritime knowledge of ships and its operation, as such procrastinate the judicial procedure, and ultimate sufferers are the poor victims. They are continuously harassed, and the perpetrators remain unfettered.

h. Section-54B (Voyage Without Telecommunication Equipment prohibited). This states:

(1) Inland ship carrying: (a) one hundred or more than one hundred passengers'; or other items (including the specified amount of cargo) shall not proceed on any voyage or be used in service unless she has been provided with such telecommunication equipment as may be prescribed.

(2) The Government may by order exempt from the operation of this section any inland ship or class of inland ships, if it is of the opinion that, having regard to the nature of the voyage in which the inland ship is engaged or other circumstances of the case, the provision of the telecommunication equipment is unnecessary or unreasonable. In this respect, the main observations are:

The law seems to be erroneous and ambiguous. A vessel that is authorized to carry passengers for revenue should have communication equipment or facility. Similar to that of an aircraft. Whether the aircraft has 20 passengers' or 100 passengers', it has to have communication set. Government may employ an

internet provider company to support the passenger vessels with an internet facility at inland waterways to communicate with the ground station and with other vessels afloat for safety reasons.

i. **Section-55 (Voyage During Storm Signal Prohibited).** It states, 'No inland ship shall proceed on any voyage or be used for any service when a danger signal of the storm is hoisted or there is a reasonable apprehension of storm'. Measures taken under such provision creates ambiguities and vessels' owners take advantage of stopping operation with a minimum warning (Signal no -1). This has encouraged owners not to improve the standard of vessels' construction to face adverse weather conditions.

j. **Section-56A (Compliance with Rules for Preventing Collisions, etc.).** This section states 'While underway, every inland ship shall comply with such rules for prevention of collisions or relating to steering and sailing as may be prescribed'. Rules need to be spelt using proper seamanship terms and be comprehensive. In this section, rules are not well spelt out for the operation of the inland ship. Collision regulation similar to that mentioned at IMO's COLREG may be adopted. IMO Resolution 58 (For Domestic Vessels) for Vessel Traffic Service may be a useful reference to take a lesson.

k. **Section-67 (Penalty for Over-loading of Passenger Vessels / Improperly Loading).** It states 'Where on any voyage for revenue purposes, an inland ship carries onboard or in any part of the vessel passengers in excess of the number set forth in the certificate of survey of the ship as the number of passengers which the ship or the part thereof is fit to carry, 67 (b) the owner or his representative, if present, onboard the inland ship or at the terminal at the time of the voyage, loading or unloading or master of the inland ship shall be punishable with fine which may extend to Taka three hundred for each passenger so in excess up to a maximum of taka one lakh'. Here the main observation is that the rule does not provide adequate punishment to defaulters as agreed by 50% of the respondents (officials and members of the marine community). At the same time, 33% disagreed that the award or the punishment of safety rules is adequate. Similarly, Section 67A, Section 67B have similar observations, which relay an inadequate scale of punishment. Wrong practice is continued without any hesitation by the owners which are vivid even after data collection was over by the

author (Despite there being directives not to carry extra passengers on launches, most of the launch authorities are not complying).¹⁰

l. Qualification of Examiners. There is no rule regarding the qualification and experience of examiners to provide competency certificates, (Chapter III, Section-38).

m. Discretionary Power of the Authority in Manning. Relaxation in manning of inland ship through satisfying the Director-General by owners create an opportunity for breach of transparency, which needs amendment. (Chapter III, Section 37).

n. Inland Ship Safety Administration (ISSA). Absence of a Functional Safety Administration is prevailing. National Shipping policy states clearly which was promulgated in 2000. This is not widely circulated in the country. Although there are indications of it in the ISO 1976, the safety administration has not been formed as per the original proposals of paid consultants to the governments.

Observation and Analysis of Design and Construction of Vessels

Design and Construction of inland vessel are guided by the relevant sections and rules of ISO 1976. Available organizational set up at the DoS has limitations to test all the designs and drawings before giving approval, which was revealed during FGD. DoS generally approve not more than 250 designs on an average in a calendar year. The authority controls the total number depending on the traffic at different routes. Once the design is approved, construction of vessels is supervised by a panel Naval Architects enlisted by the DG Shipping as panel supervisor. Vessels having less than 20m in length, the set of drawing mentioned in the rule need not be made and sent for approval to administration. This again appears not justified as vessel having a length less than 20m are constructed and being used at random for carrying passengers' and many accident cases are found with such vessels due to design faults at the study area. By law, a designer cannot be made fully responsible for such an important job, and in case of design failure, they would not be responsible. Present rules/ regulations need an amendment to solve this issue.

¹⁰ The Daily Prothom Alo, "Last Minutes Crowd at Sadarghat", Available at: <https://en.prothomalo.com/bangladesh/last-minute-crowd-at-sadarghat>.

There have been instances of indiscretions in the process of design approval, construction supervision and survey of vessels in the department. Out of all respondents from the stakeholder's department (BIWTA and DoS), about 90% agreed that the standard procedure is not followed to approve the designs and rest 10% remained neutral. Physical inspection at yards along the rivers also found that construction is being done at several places without any approved design at hand. In this respect, the legal framework allows unscrupulous activity among the stakeholders as the law is also not very clear on the issue and no provision of penalty for the designers and owners.

In this respect, the Australian National Law for marine safety has been accessed as a reference. Australian Maritime Safety (Domestic Commercial Vessel) National Law Act 2012 (as amended) specifies duties relating to design, manufacturing etc. of domestic, commercial vessels. (Division 2, Section14). The Law says: 'A person who designs, commissions, constructs, manufactures, supplies, maintains, repairs or modifies a domestic, commercial vessel, or marine safety equipment that relates to such a vessel, must: ensure so far as reasonably practicable, that the vessel or equipment is safe if used for a purpose for which it was designed, commissioned, constructed, manufactured, supplied, maintained, repaired or modified, as the case may be'.

Twenty-four designs available with the DoS have been studied, almost a dozen vessels' structures have been surveyed, and design houses consultants have been interviewed. Study shows that about 80% of those designs are not comprehensive, and none had any details of structural drawings. About 75% of the Naval architects at design houses opined that vessels are not designed to suit local requirements as shown in Figure 3. The design mostly depends on the intention and limited budget of the owners without give appropriate attention on stability and other safety criteria.

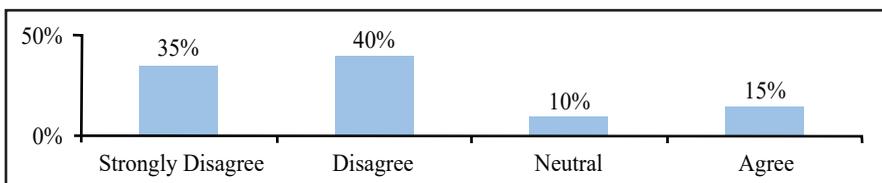


Figure 3: Vessels Designed and Built in Bangladesh to Suit Local Requirement

FGD at DoS revealed that the existing number of surveyors are not enough to complete (only about 50% of 13450 registered vessels can be surveyed) the

annual survey of the registered vessels under the department. Inland passengers' vessels are not built by taking assistance from any classification society. This is a major cause of concern in the department as they could not have any classification society as yet as per the ISO 1976. Survey data at field from design houses' members, associated builders and academicians have been taken with preset questionnaire on the standard of design of passengers' vessels. 31% of the respondents opined that the riverine vessels are not designed as per international standards, and 75% agree that these are not even designed to suit local requirements. Due to limitation of towing tank facilities, owners' unwillingness to spend sufficient budget behind design aspect, majority of the designs are copy of the previous designs which were not based on appropriate calculations considering shallow water effects and weather conditions at different geographical locations. The designers mostly try to satisfy the investors' requirements as there is no classification society's rule yet in force in the country, who can supervise as per standard rules and certify. As a result, cost-saving gets priority over other factors. The result is the production of finished vessels that are vulnerable to any kind of adverse weather condition.

ISO 1976, Rule-8 says the static angle of the heel for stability criteria should be 10 degrees, considering all passengers are assembled at one side of the vessel. Again stability criteria (A or B) is to be fulfilled as per rules set by the Inland Shipping (stability) Rules, 2001. Most of the designers select criteria B as it is easier to comply even though it results unsafe stability situation. This fixed degree of the heel and no explanation about varying loading conditions and operation at local waters need further clarification to make the vessel capable of facing the adverse situation. This situation may be improved by a complete review of the existing rules in conjunction with other international standards, including those of the IMO set rules, which have applicability for vessels operating at domestic or internal waters. Existing design and construction criteria has been doubtful. Study of accident cases by the author as well as previous researchers show that the majority of cases (83%) with the sinking of the vessels had been with vessels of length below 60 meters. Particularly vessels of length between 40-60 metres were the worst affected (45%). Woefully, 12 accident cases of vessels reveal that the vessels which were sunk due to collision were mostly poorly designed and constructed. Physical inspection of similar vessels has been done which show a grim picture rather as these are not having any watertight compartments and reserved buoyancy to avoid sinking immediately after any damage. Design house respondents do not differ in stating that the designs are unsafe.

A study has been done on the principal particulars of 200 passengers' vessels, which were in operation at the southern region of Bangladesh over a period of 20 years (1986-2016). It showed that 92 % vessels having length shorter than 40 metres had Length to Breadth ratio between 4 to 5, which is considered unsafe from stability consideration as these all have very low free board. Obviously, such vessels are more vulnerable during inclement weather. Vessels of length between 40 to 50 metres had this ratio between 5 to 6 and those above 50 metres had this ratio between 5 to 5.9. These are considered some examples of unsafe design. However, there is further scope of study in this respect.

It has been found that to minimize the cost of construction, the owners take advantage and set standards to have vessels with very less freeboard. This obviously makes the vessels vulnerable to flooding with a slight wind and wave pressure on average rough water at the river. Design should be based on water conditions prevailing around the Padma during monsoon and at the confluence of the rivers near Chandpur or at rivers near Bhola, Payra and adjacent areas at the southern part of Bangladesh, which remain rough throughout the year. Considering the ever-changing climatic conditions of Bangladesh and around, nobody would guarantee that while the vessels are on a cruise, wind speed will not increase suddenly. Moreover, the safety of life cannot be compromised with the socio-economic condition of passengers'. Again, people need to travel during monsoon and rainy seasons for livelihood. As model testing towing tank facilities are not available in Bangladesh, designers do not set any criteria of simulating adverse conditions at rivers of Bangladesh. Main focus should be on the safety of passengers' in inclement weather and preventing flooding with an average speed of wind which is acceptable by the international standards for passenger vessels. IMO has given some standard for passengers' vessels which are adopted by many countries at domestic waters including lakes. The standard laid down by IMO and RESOLUTION A.749(18) was adopted on 4 November 1993. It indicates code on intact stability for all types of ships covered by IMO instruments, which are as shown at Table 2.

In Intact stability criteria (1 and 2)	The minimum range of stability (a, b , c)
1.The area under the righting lever curve up to the angle of the maximum righting lever should not be less than 0.08 meter-radians.	a. Length less than 100 meters: 20°
2. The static angle of the heel due to a uniformly distributed wind load of 0.54 kPa (wind speed 30 m/s) should not exceed an angle corresponding to half of the freeboard for the relevant loading condition, where the lever of wind heeling moment is measured from the centroid of the windage area to half the draught.	b. Length greater than 150 m: 15° c. Length 100-15 m: by interpolation

Table 2: IMO Guidelines for Stability Criteria of Inland Vessels

Guidelines similar to those of Australian Maritime Safety Administration (AMSA) and IMO may be consulted by local designers after the necessary amendment of rules. Owners occasionally try to influence designers to meet their commercial needs even at the cost of safety. Builders also tend to follow those instructions and there are instances that they deviate from the approved designs (51.9%) as shown in Figure 4. Members from the design houses as well as some builders’ representatives were asked whether vessels are always constructed as per approved designs.

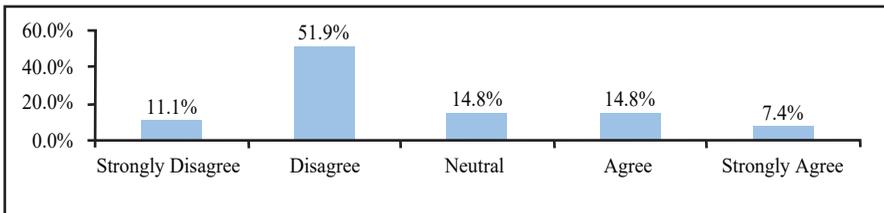


Figure 4: Opinion of Owners to Get the Vessel Constructed as per Approved Design

Panel supervisors detailed by the DoS are responsible mostly for inspection at the construction site. 83% of respondents from the yard/ DoS mentioned that regular inspection at the construction site is not done as shown in Figure 5. Personnel at construction yards and design house members were asked whether inspections are done at regular interval during construction.

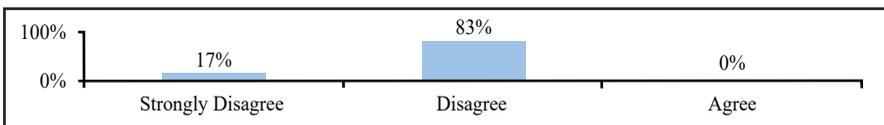


Figure 5: Inspections are Done on Regular Basis During Construction

Operation of Sunken Vessels

Recorded data with the DoS shows about 256 sunken deck vessels (one and half deck vessels) are operated at five river ports in Bangladesh with risk. These vessels have no standard designs and as per experts' opinion, such vessels should have been stopped to operate much earlier. The vessels have poor stability criteria and have no water tight integrity as per international standard. The authority also has similar opinion on such vessels. However, due to weaker safety administration, such unfit vessels are being operated at random, which only reflect inappropriate governance in the sector.

Conclusions

Safe operation of passengers' vessels is often disrupted due to occurrences of accidents with huge loss of valuable lives and property. Associated investigation reports and researches hardly expose the root causes related to legal issues that impact governess processes. To ensure safety standard of international level at IWT, a strong safety regime is prerequisite. The existing rules have need to be strengthened and implemented as per the guidelines at national shipping policy. Inland Ship Safety Administration (ISSA) has not been adequately strengthened, which needs to be functional and participatory.

Survey reveals that the majority of designs of the IWT passengers' vessels have shortcomings, which result in unsafe construction. Accident reports also show that vessels that were sunk on different occasions at rivers were due to faulty design. It is also revealed that there is hardly any control on the dimensions of vessels. The vessels are not standardized and stability criteria prior construction are not considered according to international standards which need to be reviewed. The existing law needs clear provision for shipbuilders, who regularly build vessels anywhere they would feel like. The authority appeared concerned about it, but it needs to resolve through the formation of laws. Existing law does not make it mandatory for owners to keep communication sets for vessels with a carrying capacity of fewer than 100 passengers. This situation poses the operators with a challenging situation for which they can hardly do anything. Rules as regards to selection of crews for manning, design approving process, supervision of vessels' construction, and infrastructure need to be reviewed. This would result in a more transparent process which would ensure better safety standards and a transparent system. Existing laws regarding scales of punishment and penalty are old and need to be reviewed to make them more effective in line with other international systems available. There is no provision in the laws for designers, builders, and

guidelines on sharing responsibilities between stakeholders' departments for more effective governance. IMO's prescriptions for IWT may be considered as useful guide, which is not much discussed at IWT.

Recommendations

The regulatory framework for IWT needs to be strengthened by amending the existing rules of the Ordinance and Subsequent transformation of these into Acts. Areas that need more attention are penalty clauses to confirm suitability, demarcation of responsibilities and accountability for institutions to avoid duplication, design and stability criteria for vessels as per international standard, accountability system for inspectors, supervisors, designer, judiciary, the welfare of crews, etc.

From design point of view, there has to be significant improvement on the quality of vessels. Stability criteria of vessels be set to suit river conditions at all seasons at different routes, considering the safety of the vessels in existing scenario and in line with international standards (IMO). Design criteria be reviewed, freeboard to be adequate to save vessels from flooding easily, length to breadth/width ratio for vessels having length 45 metres or less shall be of magnitude 3.5 or below and for vessels with length higher than 45 metres may be below 5.5. Provision of reserve buoyancy for vessels be compulsory, to save from sinking. Design of vessels is to be made keeping the focus on the safety of personnel on board and user friendly. Internationally accepted norms and standards should be maintained considering that rivers are now regionally connected. IMO's guidelines may be followed so that safety matters are not compromised. Laws regarding activation of classification society may be implemented without any compromise.

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TREND OF GLOBAL AND LOCAL SHIPBUILDING

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Abstract

Shipbuilding is a state supported industry, which enjoyed government subsidies and always an attractive industry for developing countries. Bangladesh as a country with large population has golden opportunity to get success in labor intensive heavy industry like shipbuilding. Bangladesh has required potential to establish herself as a promising shipbuilding nation and revive the glorious history of maritime sector. But, Bangladesh cannot keep pace and regularity in this business due to lack of appropriate strategy and policy and fails to penetrate international shipbuilding market. Moreover, local shipbuilding also has few inherent challenges. From this study it has been revealed that, small and medium size container, tanker, cargo, multipurpose and special types of ships with 3000-10000 DWT (approx) is suitable for Bangladesh. However, very recently the opportunity of FDI has created in shipbuilding sector. Country like China, Turkey, and Netherlands has showed their keen interest in this sector.

Keywords: Shipbuilding, Shipping, Niche Market, Recycling

Introduction

Shipbuilding industry has suffered from the absence of global control and role and a tendency towards over-investment due to the fact that shipyards offer a wide range of technologies, employ a large number of workers and generate income as the shipbuilding market is worldwide. Shipbuilding is always a state supported industry and enjoy government subsidies.¹ As a result, shipbuilding is an attractive industry for developing countries. After World War II, Japan used shipbuilding in the 1950s and 1960s to rebuild its industrial structure; Again South Korea started to make shipbuilding a strategic industry in the 1970s and become global market leader in 2003. Then China follows the same process and repeated these same models by ensuring large state-supported investments in this sector and become the global leader in 2008.² Presently the global shipbuilding market

¹ Z Lixing, "Development oriented finance and economy in China: A historical review and prognostic assessment", Printed in Bloomington, Indiana, USA, 2009.

² D Michael, "China: A modern history", I B Tauris and Co Ltd, London, UK, 2010.

suffers from inflation, geopolitical situation, over-capacities, depressed prices low profit margins, trade distortions and widespread subsidization. Local shipbuilding have enough potential to revive her glory by optimizing capacity and capturing recommended niche market during on going global inflation.

It is an overview and analysis article on global and local shipbuilding, where both primary and secondary information has been taken from different sources. There are plenty of information and literature related to global shipping and shipbuilding available both in library and in nets. But, there are very few literature, studies, reports, and articles available on local shipbuilding. Again, there are few studies have been carried out on local ship breaking or recycling industry. Actually there are almost no systematic study has been found on trend analysis of global and local shipbuilding as well as critical analysis on local shipbuilding and its suitable market. So, an effort has been taken to study the global and local shipbuilding trend as well as depict suitable market and viable suggestion for local shipbuilding.

Overview of Global Shipbuilding

Shipbuilding is a primitive industry, deals with construction of ships and floating vessels. Shipbuilding activities usually takes place with heavy installation of machinery and which is known as a shipyard or dockyards. Shipbuilding industry is usually doing the design and construction of oceangoing ships and specialized vessel. Today, the global shipbuilding industry is leaded absolutely by Asia-Pacific followed by Europe and America with some specialized niche market. Asia-Pacific (mainly by China, South Korea, and Japan) is expected to maintain its supremacy in the global market, due to few well-defined and inherent advantages. Those advantages are: comparatively cheaper labor wages, strong government back up, favourable government policy, preferable mind set up, political stability, economic strength, as well as strong forward and backward linkage industries. It is a highly capital intensive industry, which produce costly unit production instead of mass production like Ready-Made Garment (RMG). As a result, shipbuilding needs strong government policy and support, favourable strategy and management as well as political stability and those are prerequisite to flourish and survive in the competitive world.

In 1860s, the epoch of modern shipbuilding has started with the development of manufacturing industry. From that time use of iron and advanced steamers has added the new dimension in shipbuilding. Ships owners like such strong and reliable ships because of longer voyages the ships could sail and they

can use ships for better commercial operations. As a result, in later 19th century successful symbol of such ships could be confirmed by the phasing out of sailing vessel. In late 19th century, UK was absolutely the biggest shipbuilding nation. However, from 1892 to 1894, UK produced over 80% of the ships sailing worldwide in terms of gross tonnage (gt). At that time, UK holds the leading position of world trade and they need huge merchant fleets to control all over the globe. Moreover, to maintain their colonial supremacy, UK needs such vast shipbuilding.

Trend Analysis of Global Shipbuilding History

Beginning of Global Shipbuilding Era. In Europe, UK was the front most states of world economy since the industrial revolution. They were the most successful productive nation of many industrial products including steel, materials, system, equipment and machinery. The industrialization of UK was well ahead in comparison with most of the nations in the world, as they provided the foundation to demand for the ships due to increasing trades generated by their booming economy. And that time, UK controlled most of the trade flows in the world. In 1902, Lloyd's Register of Shipping has showed that, the tonnages owned and operated by UK accounted for nearly 45% of the global merchant fleet. At the same time, UK shipbuilding industry occupied almost 58% of global market share. Again, in 1910 to 1920, UK produced nearly 70% of the global production. However, after reaching the peak of success, there was falling history. As the irony of fate, UK has lost its position both in shipping and in shipbuilding market. Finally, in 1982, the global shipbuilding market share of UK was below 1% as well as global shipping market of UK was below 3%.

State of Shipbuilding in Other European Countries. At the same time span, during the blooming period of British shipbuilding industry, the shipbuilders of other European nations were rather active at global market. In 1900 to 1950 European shipbuilders have entered to shipbuilding industry gradually together with UK Shipbuilders. The market share of Continental Europe (like Germany, France, and Netherlands) up to 1945 was 20% to 40% of the global. They were also controlling the global merchant fleet with a relative high share. In 1931, the Scandinavia shipbuilders were captured 21% of the global market share. However, UK along with European Countries (EC) were also losing their trade and market share of shipbuilding simultaneously. Again, from the analysis of the statistics of Lloyd's Register of Shipping and history, it is clear that, the increase of market share of shipbuilding always went along with the swelling of the size of national

fleets. Finally, after 1986, the entire maritime industry of Europe had declined significantly.

Superiority of USA after WWI. The shipbuilding of UK started to decline during the First World War (WWI). After WWI, in the first half of 20th century, USA took the production center of world shipbuilding away from the UK and EC. The market share of the USA industry in late 1910s captured around 60% of global share. During the same period, those major traditional shipbuilding nations, like UK or EC, had produce less ships due to the war. It need to mention that, the industry in USA invented and introduced new concept of production in shipbuilding and they have set the new shipbuilding standard (like ABS) in design and production. That creativeness in shipbuilding made by USA has also significant influence in this heavy and primitive industry. The great shipbuilding history writer Martin Stopford stated that, ‘This was the first step towards standardized shipbuilding practice, though construction methods at these yards did not conform to the complete prefabricated unit principle introduce later’.³ During WWII (1940 to1945), the market share of USA shipbuilding had climbed the highest peak and they captured 90% of global share.

Decline of Global Market Share of USA after the WWII. In 1950, the market share of USA has declined to 10% to the global shipbuilding market. Actually the reason behind the huge productions of ship by USA during the wartime was due to the triggered and supported the industry by USA government. It is really interesting that, the governments during wartime, were heavily subsidized the local industry by USA government in order to meet the demand of both military and commercial. With the removing of subsidies in post WWII, the inherent disadvantage of USA shipbuilding industry (as 30% to 50% of higher in construction cost in comparing to other nations), they have lost their market position.⁴ So, the lesson learnt from USA case is that, the political interruption played an important and driving role in the shipbuilding for any nation. From the analysis of modern shipbuilding history, it can be depict that, in the first half of 19th century; Western Countries (both European and American) dominated modern shipbuilding industry due to their inherent local demand for ships.⁵ At the

³ M Stopford, “Maritime Economics”, Routledge, New York, USA, 2009.

⁴ K A Hossain and M N G Zakaria, “A Study of Global Shipbuilding Growth Trend and Future Forecast”, Procidia Engineering, 2017.

⁵ M N G Zakaria, M T Ali and K A Hossain, “Underlying problem of ship recycling industries of Bangladesh”, Journal of Naval Architecture and Marine Engineering, 2012.

same time, the size of fleets owned by the nations was also important. However, the competitive advantages also played another big role.

Emergence of Japan as Shipbuilding Center after WWII. After WWII, Japan started their industrial revolution, where they first concentrated to heavy industry. Shipbuilding as heavy industry is the multiplier of small and medium industries. The expansion and booming of Japanese shipbuilding industry was due to well planning and initiative taken by Japanese Government, just after WWII. Japan selected the shipbuilding industry as one of important industrial sector to rebuild the country's economy which was largely destroyed during WWII. Government departments, ministry of transport, were the central planner and they worked with experienced persons in maritime sectors to co-ordinate the distribution of the resources to the maritime sector. The Japanese strategy included collective allocation of the orders from domestic ship-owners and anticipated the production schedule for all shipbuilders. Again, Japan Development Bank (JDB) was also involved actively in the schedule by contributing favorable loans to local ship owners. The amount of funds flowing to marine sectors was vast, and that was over 30% of the total loans provided JDB. Moreover, the shipbuilding itself employed economies of scale by efficiently expanding to their production capacity. As a result, a huge investment was taken place to set up advanced and giant shipyards.

After that, Japanese ships became very competitive in the global market due to integrated production technology. Japanese shipbuilding technology improved productivity and that was accredited to the employment. At the same time, the domestic orders of new-buildings were also increased manifold. As a result, since 1950, the outcome of these measures and efforts made by Japan Government had boasted up Japanese shipbuilding and they capture the large global market share. Finally in 1960s, the Japan became the global market leader by supplying about 50% of the tonnage for global fleet. Again from analysis of the statistic of Lloyd's Register of Shipping and history, it has been proved that, in contrast to the success of Japanese shipbuilding, the Japanese national commercial fleets did not growing as the shipbuilding sector was grown up. In 1973, the Japanese share of the global shipping market was just around 10%. On the other hand, under the flags of convenience as per IMO and UNCTAD, Japan was the owner of 73% of global fleet (under the flag of convenience). So, the development of open registration in 1970's under the flags of convenience was also helps Japan to develop their local shipbuilding.

Actually, the open registration started in 1900's and had a rapid development after WWII. The ship owners who fly flags of convenience had less constraints on business decisions and operational activities than they fly national flags. However, the orders of new-buildings, was one of business planning and decision and that was free of controlling by flag states. Again, those new order mostly are subject to market mechanism and which guides ship-owners to place the orders of new-building ships according to their preferences by the nations.⁶ The great shipbuilding writer Martin Stopford concluded in his book *Maritime Economics* is that, 'The reasons of booming of Japanese shipbuilding industry were that, their shipbuilding became highly competitive and obtained a high penetration of the export market, particularly the market for larger tankers sold to independent owners'.

Surfacing of South East Asia as Global Center. The story of rising up of the South Korean shipbuilding was really near to fairy tale. At the same time, other Asian nations, who grew con-temporarily, Asia, the global shipbuilding center in 1980s. Japan was the shipbuilding leader with market share of around 46.5%, at the beginning of 1980s. In that time, the market share of South Korea was below 4%, with only 4% of global share. Then European share was about 33.5% of global market. Interestingly, 'There was remarkable change of global share at the end of 1980s. South Korea grew rapidly and gained substantial global share around 22%. Japan kept its position firmly with almost 43% of global share. Then China emerged at the first time in shipbuilding, with global market share of around 2.3%. In 1980, the most amazing and notable development during the years was that the global market shares of all South East Asian Countries were around 70%'.⁷ So, shipbuilding centers had been totally shifted from Western (Europe and USA) to Asia at the end of 1980s. Finally, the global market share of Europe declined significantly by around 10%. However, the trend of global market leadership of shipbuilding with probable causes has been shown in Table 1.

⁶ K A Hossain, "SWOT Analysis of China Shipbuilding Industry in the Third Eyes", *Journal of Recent Advancement of Petrochemical Science*, vol 4, no. 2, 2018.

⁷ K A Hossain, "Analysis of important steering factors which give Success to Global Shipbuilding Leaders", *Journal of Recent Advancement of Petrochemical Science*, vol 4, no. 5, 2018.

Duration of Shipbuilding Leadership	Country	Causes of Lost Leadership
1860's-1950's	UK(Great Britain)	Failure to modernize local shipbuilding. Shipbuilding labor cost becomes high. Downsize own fleet. Lost global leadership by politically and economically
Mid1950's-mid1990's	Japan	High cost of shipbuilding with aging. High shipbuilding labor cost. Decrease shipyards R&D budget (less than 1%). Increase gap between demand and supply of steel. Increase steel price. Reduce government support.
Mid1990's to 2009	South Korea	High cost of shipbuilding labor. Increase gap between demand and supply of steel. Increase steel price. The appreciation of Korean local currency (won) has worsened the competitiveness of Korean shipbuilding. Reduce government support.
Since 2010' (it was earlier than Chinese planned)	China	Low human resources cost. Low shipbuilding labor cost. High shipbuilding labor cost. Ambitious government program for the shipbuilding development. Growing shipyards capacity. Friendly government policy and strategy. Increase governmental subsidies.

Table 1: Trend of Market Leadership of Global Shipbuilding Industry

Trend Analysis of Local Shipbuilding History of Bangladesh

Past Trend of Local Shipbuilding. Indigenous shipbuilding history of Bengal has a glory and stand on firm foundation. During the first half of the 19th Century, the Shipyards at Chattogram were capability of built ships around 1000 dwt. During Pakistan period Public Shipyards dominated the shipbuilding industry. At present, Private Sector has emerged as the major player of Bangladeshi shipbuilding. There are around hundred shipyards concentrated at different places of the country; where inland, costal and fishing ships are built. In 1979 FAO funded contract for supply of 08-food grain carrying vessels to Bangladesh Inland Water Transport Corporation (BIWTC) was secured by High-speed Shipbuilding and Engineering Company (HSEC) Ltd., Narayanganj, Dhaka through international tender. These were Class Vessels. Mitsui Engineering and Shipbuilding Industry (MESI) of Japan entered into a joint venture in shipbuilding with High Speed Shipbuilding and Engineering Co. Ltd. and a construction project of 04 deep-sea fishing craft was undertaken. 'Recently some shipbuilding Industries including Ananda Shipyard and Slipways Ltd (ASSL), Dhaka and Western Marine Shipyard (WMS) Ltd, Chittagong have come up with all moderately standards shipbuilding facilities that enabled them to receive export

orders. In 2008 for the first time Ananda Shipyards exported class ocean going cargo ship with 3500 dwt capacity, small ferries and boats include three aluminum catamaran passengers' vessels to Denmark and Mozambique and thereby secure the name of Bangladesh in the list of ship exporting nations'.⁸

Present Trend of Local Shipbuilding. Private local shipyards are mainly constructing steel ships that are suitable for inland and coastal water. They can design and fabricate ship around 4500 DWT to support the local demand. The most of the private shipyards are operating under individual management, with minor supervision of government. The numbers of vessels built per year by them are quite many. They employ huge number of skilled and unskilled labor in casual basis. The most of the private shipyards are highly depend on Bhatiary ship recycling industry. However, private shipyards need special attention by government to develop them as quality shipyards. However, 'Among these yards there are dozens of private shipyards are capable of manufacturing good quality small and medium ships to fulfill the requirement both local and foreign ship buyers/owners'.

There are three public shipyards are successfully running by management of BN. DEW Ltd as an oldest shipyards in the region building new ships and repair many vessels in this region since 1926. It has the experienced to built Ro-Ro Ferry, Tug-boat, LCT, OPV, aluminum high-speed boat, etc. KSY Ltd as another shipyard has built 400 new ships and repaired more than 3000 vessels since her inception in 1957. Very recently they built dozen of international standard naval ships joint venture with China shipbuilding giant CSIC. Country's only dry dock, CDDL has repaired more than 1000 merchant and naval ships since her from 1982. Presently CDDL is preparing to build Frigates and OPV for BN. All three public shipyards are running by BN profitably are quite capable to built both merchant and naval ships with small and medium size.

Trend Analysis of Global Merchant Ships

Ships are widely used for transportation of various commodities from large machines, vehicle, food grain, and ore to even oil, and passengers also. Transportation through water is always cheaper as compared to that of air, road, and rail. Ships are versatile as it has no state boundary and operated through sea and ocean. Again it exempting the changing exchange rates and the currency

⁸ K A Hossain, "Evaluation of potential prospect and challenge of Bangladeshi shipbuilding in light of global contest", MSc Thesis, Dept of NAME, BUET, 2010.

adjustment factor or fee imposed on the carrier companies and that gives additional advantages. Usually ‘merchant shipbuilding market has divided mainly into oil tankers, bulk carriers, container ships, general cargo ships, and passenger ships. Global merchant fleet statistics by main ships types in the year of 2020 to 2021 in thousand DWT and in percentage has been shown in Table 2. It is mention that that, during analysis and fleet size calculation, all propelled and seagoing merchant vessels of 100 gross tons and above has been considered.⁹ So, it has been cleared from the table that, as of January 2021, the global merchant or commercial fleet has grown by around 3% in average.

Main Ships Types	2020 (thousand dwt)	Percentage (%)	2021 (thousand dwt)	Percentage (%)	% Charge 2021 Over 2020
Bulk carriers	879725	42.47%	913032	42.77%	3.79%
Oil tankers	601342	29.03%	619148	29.00%	2.96%
Container ships	274973	13.27%	281784	13.20%	2.48%
Other types of ship	238705	11.52%	243922	11.43%	2.19%
Offshore supply	84049	4.06%	84094	3.94%	0.05%
Gas carriers	73685	3.56%	77455	3.63%	5.12%
Chemical tankers	47480	2.29%	48858	2.29%	2.90%
Other/not available	25500	1.23%	25407	1.19%	-0.36%
Ferries and passenger ships	7992	0.39%	8109	0.38%	1.46%
General cargo ships	76893	3.71%	76754	3.60%	-0.18%
World total	2071638		2134 640		3.04% average inc

Table 2: Global Merchant Fleet Statistics by Main Ships Types from 2020 to 2021 in Thousand dwt and in Percentage

On the other hand, ‘the total number of all main types of merchant ships in the world was 99800 or in short 0.1 million in 2020.¹⁰ And the equivalent total capacity in dwt of merchant ships in the global fleet was 2,134,639,907 or in short 2.13 billion dwt. Again annual growth rate of global merchant fleet in percentage on the basis of ships dwt in the year from 2000 to 2020 has been shown in Figure 1. The graph has been drawn as per the calculation on the basis of data collected from Clarksons Research’.¹¹ From analysis of the graph it has been found that, the ships growth rate gone to the peak in the year of 2011 with 11%. Again ‘the ageing of the merchant fleet is always a important concern, as older ships are generally less efficient, generate higher emissions (of CO₂, CO, NO, etc) and which is

⁹ Clarksons Research, “Shipping Review Outlook”, 2021.

¹⁰ UNCTAD, “Global Trade Update, World trade rebounds to record high in Q1 2021”, May 2021.

¹¹ Clarksons Research, “Seaborne Trade Monitor”, vol 8, no. 6, 2021.

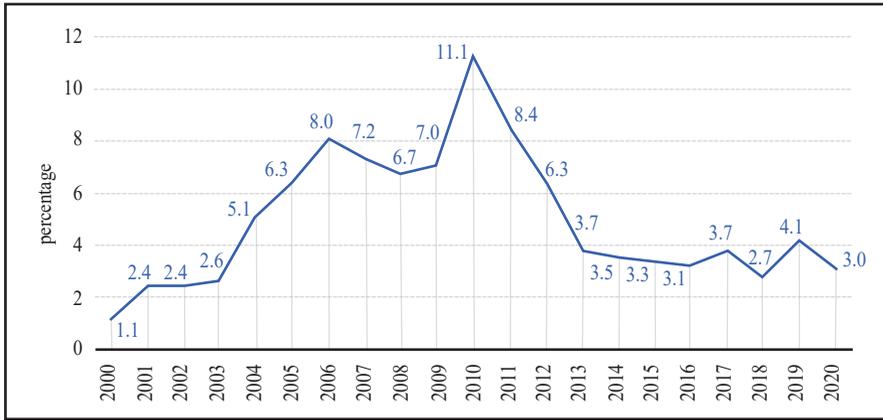


Figure 1: Annual Growth Rate of Global Merchant Fleet, in % on the Basis of Ships DWT from 2000 to 2020

danger for environment. On the other hand, the age distribution of the global merchant fleet with share of the global carrying capacity in 2021 in percentage has been shown in Figure 2'.¹² From the analysis of the graph it has been cleared that, the younger group has been falling, while that for ships of 10 to 14 years old has been rising steadily.

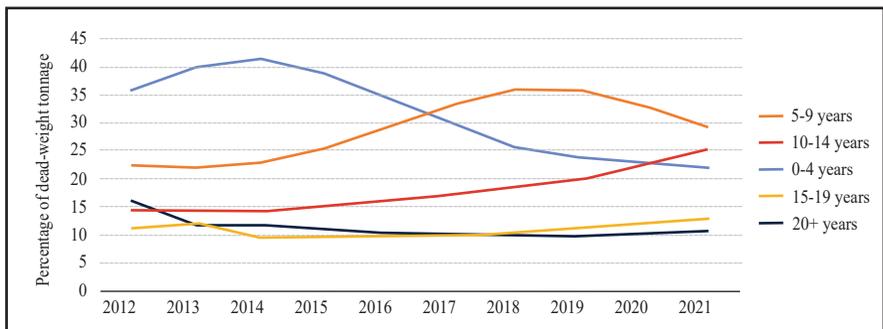


Figure 2: The Age Distribution of the Global Merchant Fleet with Share of the Global Carrying Capacity in 2012 to 2021 in Percentage

The age distribution of the global merchant fleet as per development status groups in 2021 in percentage has been shown in Figure 3.¹³ From the analysis of the graph it has been cleared that, the age distribution varies between different

¹² Clarksons Research, “Shipping Intelligence”, no. 1478, 2021.

¹³ Clarksons Research, “World Shipyard Monitor”, vol 28, no. 1, 2021.

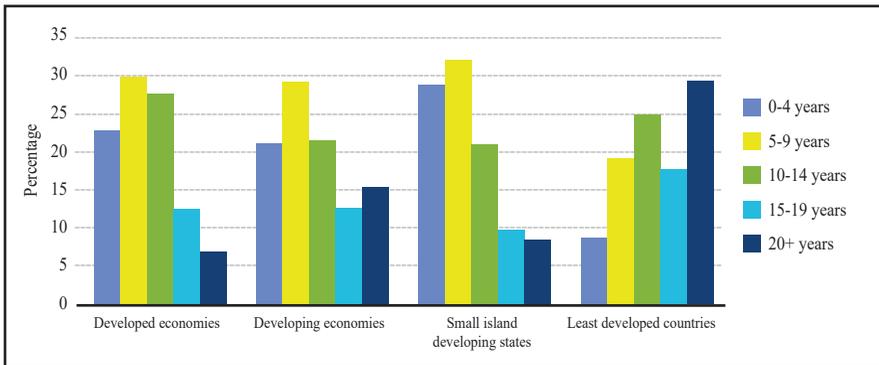


Figure 3: The Age Distribution of the Global Merchant Fleet as per Development Status Groups in 2021 in Percentage

economies (Developed, developing, LDCs, SIDS, countries). The oldest ships (more are than 20 years old) are generally found in the least developed countries (LDCs) and that is around 30%. Again compared to the developed and developing countries, the LDCs also have a higher proportion of ships in age group from 15 to 19 years old. However, its need to mention that, the LDC and SIDS country grouping has been based on the definition by the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS). It is interesting to know that, ships are getting bigger as well as introducing very few in the global merchant fleet. But, most of the bigger ships of the existing merchant fleet are ageing day by day.

Trend Analysis of Ships Size and Constrain

The share of mega-container ships in global merchant fleet carrying capacity by TEU in the year of 2011 to 2021 in % has been shown in Figure 4.¹⁴ From the analysis of the graph it has been cleared that, since the early 2010s, most of the world's cargo has been carried in as usual container ships with ships capacity below 10000 twenty-foot equivalent units (TEU). However, 'from 2011, mega-container ship with capacity of greater than 10000 TEU has been introduced in the global merchant fleet. So, from 2011 to 2021, proportion of container ships carrying capacity rose from 6 to 40% and less than 10000 TEU container ships have been reduced gradually. Again the number of mega-container ships in global fleet has been shown in the Figure 5'. From the analysis of the graph it has been

¹⁴ Clarksons Research, "Container Intelligence Monthly", vol 23, no. 6, 2021.

cleared that, in the last 10 years, there have been 97 new ships of between 15000 and 19990 TEU as well as since 2018, 74 new ships of 20000 TEU and above have been commissioned to the global container fleet. It is interesting to know that, ‘these mega-container ships have been facilitated by technological advances, and also have been part of broader corporate strategies to pursue economies of scale’.¹⁵ On the contrary, this has been resulted in excess supply or ‘over tonnage’ in the global major liner routes, with greater pressure on infrastructure as well as on the port logistics.

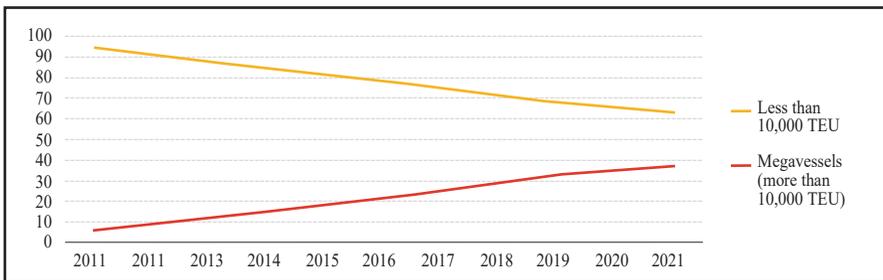


Figure 4: Share of Mega-Container Ships in Global Merchant Fleet Carrying Capacity by TEU in the Year of 2011 to 2021 in %

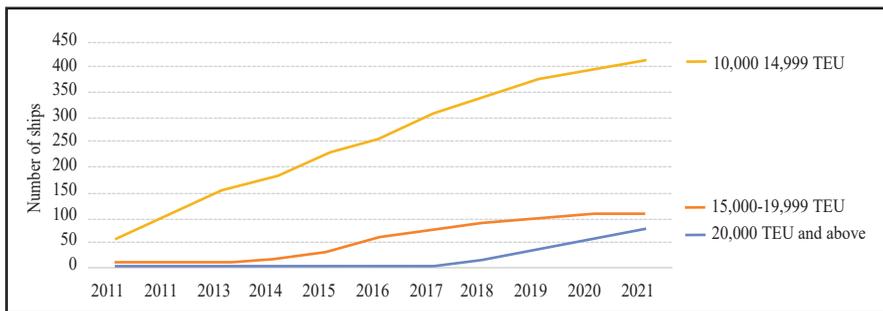


Figure 5: Number of Mega-Container Ships in Global Fleet

This pressure on infrastructure has been dramatically illustrated from 23 to 29 March 2021, as the Suez Canal was blocked by the mega-container ship Ever Given, which carrying capacity was 20000 TEU. In that incident it was again prove that, ‘larger ships are more difficult to steer and harder to handle as well as more costly to rescue in cases of collisions, groundings and severe accidents. However, in addition to safety and salvage issues, it is also learn that, the higher

¹⁵ Clarksons Research, “Suez Canal Blockage: Summary and Context”, 2021.

risks entail higher insurance costs and which was encumbrance for the whole industry'.¹⁶ This is a critical issue for the global maritime transport network in particular to the Suez and Panama canals, which have constrained capacities. So such 'sensitive disruption sends shock waves to the entire global supply chains. The Ever Given incident has been delayed the passage of hundreds of vessels through the Suez Canal. As a result that incident has disrupted global trade and has aggravated the shortage of shipping containers as well as leading to congestion in many ports. Finally the container freight rates have increased'.

Trend Analysis of Global Shipbuilding New-Orders

Let's see the trend analysis of shipbuilding industry in the recent past. It is interesting to know that, the two-thirds of world ship building were of dry bulk carriers and tankers. In 2020, ship deliveries declined by 12%, mainly due to lockdown-induced labor shortages during the first half of the year that disrupted marine-industrial activity. In 2020, the new-ships delivered were mostly bulk carriers, followed by oil tankers and container ships and that has been shown in Table 3. Since 2015, an increasing proportion of shipbuilding has taken place in just four countries and they are; China, South Korea, Japan, and Philippines. In 2020, their combined market share has risen to 96%.

Ships type	China	South Korea	Japan	Philippines	Rest of the world (ROW)	Total	%
Bulk carriers	15051	1442	9383	551	311	26738	46
Oil tankers	2702	7071	1901	1	478	12152	21
Container ships	2665	5357	394	56	200	8671	15
Gas carriers	869	4046	353		7	5275	9
Ferries and passenger Ships	251	64	76		1208	1600	3
Chemical Tankers	488	88	465		55	1095	2
General cargo	390	1	142		360	893	2
Offshore	340	101	7		118	566	1
Other	501	4	107		162	775	1
Total	23257	18174	12827	608	2898	57765	100
%	40	31	22	1	5	100	

Table 3: Deliveries of New-Building Merchant Ships (in Thousand Gross Tons) by the Countries in 2020

¹⁶ N Roussanoglou, "Ship Owners Order more Container Ships and LNG Carriers", 2021.

Trend Analysis of Global Ship Recycling

In 2020, almost half of the recycling was of bulk carriers, reflecting declining charter rates and following the trend of recycling ageing tonnage in LDT.¹⁷ It's more interesting for us that, 'around two-thirds of reported tonnage (LDT) sold for recycling in 2020 was in Bangladesh and India. With the addition of Pakistan and Turkey, the share of the top four countries reached 93% and that has been shown in the Table 4. The highest increases in shares have observed for Pakistan, by 14.7%, and for India by 3.2%'.¹⁸ In contrast, there were noticeable reductions in Bangladesh, by 15% and in China by 2%. The market share of China has reduced due to ban on recycling international ships, which entered into force in 2018. As a result, between 2017 and 2020, China's share of global recycling tonnage (LDT) fell from 16% to 1%. On the other hand, deduction of recycling market share of Bangladesh has observed due to local restriction and implementation of government recycling instruction.

Ships type	Bangladesh	India	Pakistan	Turkey	China	Rest of the world	World total	%
Bulk carriers	5254	1317	1718	34	125	61	8509	48.9
Container ship	160	1428	282	206		68	2143	12.3
Oil Tankers	616	410	617	159	10	226	2038	11.7
Offshore supply	125	257	4	308	3	273	969	5.6
Ferries/ passenger ships	26	179		545	3	26	879	5.1
General cargo	176	219	175	203	47	29	848	4.9
LPG/ LNG	169	141		8		176	594	3.4
Chemical Tankers	12	125	94	1		10	241	1.4
Other	157	786		135	9	93	1180	6.8
Total	6694	5061	2890	1598	195	962	17401	100.00
%	38	29.1	16.6	9.2	1.1	5.5	100.0	

Table 4: Global Ship Recycles in Tonnage or LDT in Thousand Gross Tons Sold in 2020 (for Main Ship Types)

Trend Analysis of Global Shipbuilding New-Orders

The COVID-19 pandemic severely affects the global economy, trade, social life, maritime transport and shipbuilding business. However, 'the outcome was less damaging than initial anxiety. The pandemic shock in the first half of 2020 has caused maritime trade reduced by 3.8 % and in the second half there was

¹⁷ UNCTAD, "Impact of the COVID-19 Pandemic on Trade and Development", 2021.

¹⁸ UNCTAD, "Ship Recycling by Countries Annual", 2021.

a recovery. But in the third quarter of 2020 both containerized trade and dry bulk commodities trade increased. But tanker shipping fails to recover. At the same time present Russian war on Ukraine as well as rise in oil price change the entire situation. However, with the recovery of global trade, GDP and maritime trade in 2021 have also increased by 4.3% and that has been shown in Figure 6'.¹⁹ And international maritime trade by region in 2020 by % share in tonnage has been shown in Figure 7. It is interesting to know that, the medium-term outlook remains positive; however with some risks and uncertainties, because of moderated growth in the global economy. From the GDP and maritime trade ratio graph it is clear that, over the past two decades, the compound annual growth in maritime trade has been found 2.9%. On the other hand, over the period 2022–2026, UNCTAD predicts that the rate will be slow and low and that will be around 2.4%.

In 2021, dramatically shipping companies reacted to the capacity constraints with a rush of new orders. The trend of global containerized trade, for 1996-2021 (Million TEU and % annual change) has been shown in Figure 8. The calculation and graph has been drawn by the assessment of UNCTAD on the basis of MDS Trans-modal, World Cargo Database, June 2021 and data of Clarksons Research 2021. Interestingly, ‘container ships orders in 2021 have found the highest for the last two decades. There were also more orders for LNG and other

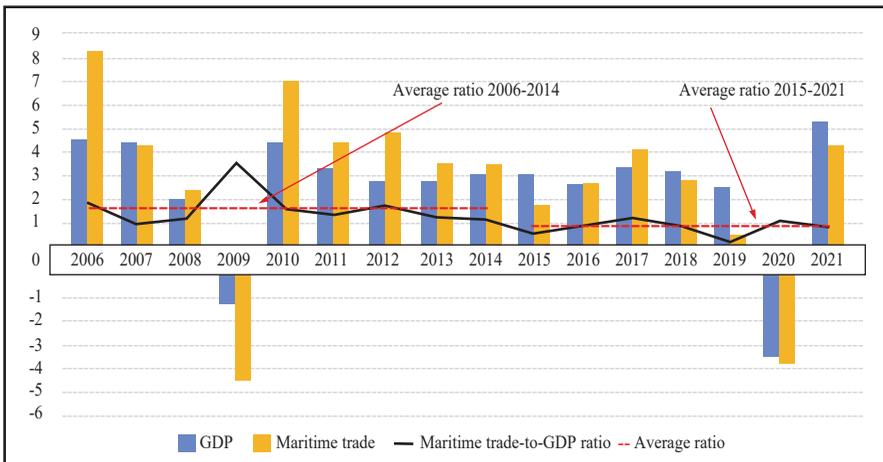


Figure 6: International Maritime Trade, World GDP and Maritime trade to GDP ratio, 2006-2021(in %, Ratio)

¹⁹ UNCTAD, “Ship Recycling by Countries Annual”, 2021.

gas carriers'.²⁰ The Clarksons research, UNCTAD, Lloyd, Epicflow and most of the ICS predicts that, future demand of major types and size of new ships will increase in general and small and medium type of container and bulk cargo ships in particular. Researcher has met and taken interviews personally of few merchant mariners, ICS personnel, international shipbuilders and ships owner. Most of them predict that, there will be a niche-market for small and medium size of container, bulker and cargo ships for small shipbuilders like Bangladesh.

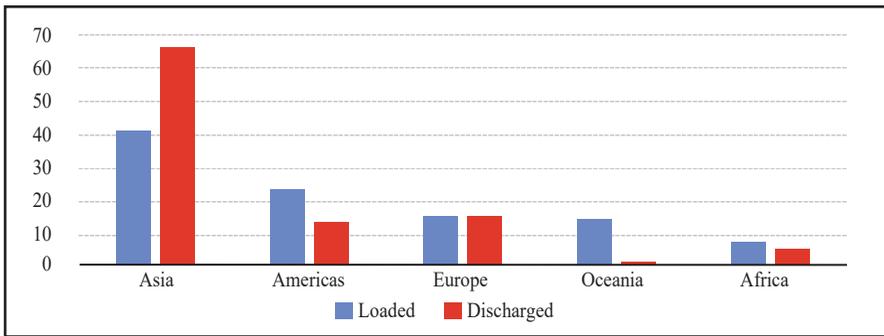


Figure 7: International Maritime Trade by Region, 2020 (% Share in Tonnage)

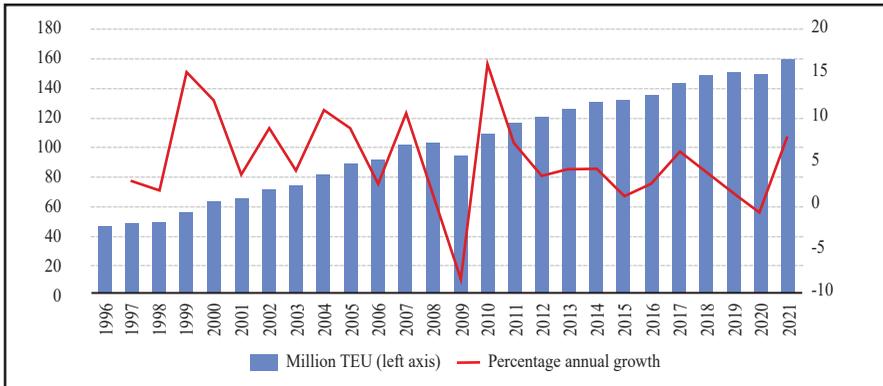


Figure 8: Trend of Global Containerized Trade, from 1996 to 2021 (Million TEU and % Annual Change)

²⁰ N Roussanoglou, “Ship Owners Order more Container Ships and LNG Carriers”, Hellenic Shipping News Worldwide, 2021.

Capability and Challenges of Local Shipbuilding

A number of various types of ships and vessels are built in local shipyards around the country. The vessels built in local shipyards are: Multipurpose vessel, Coaster, Dry Cargo Vessel, Cargo Coaster, Passenger Vessel or Ferry or Lunch, Double Decker Passenger Vessel, Tanker, Container vessel, Landing Craft, Tug, Dump Barge, Supply Barge, Deck Loading Barge, Self Propelled Barge, Dredging Barge, Research Vessel, Survey Ships, Hospital Ship, Tourist ship, Inspection Vessel, Pleasure Craft, Yachts, Ro-Ro Ferry, Crane Boat, Speed Boat, Hydrographic Survey Boat, Work Boat, Pilot Boat, Water Taxi, Pontoon, Catamaran Vessel, Sand Carrier, Troops Carrying Vessel, Fast Patrol Boat, OPV, PC, LPC, LCV, LCT, Deep Sea Trawler, etc. There are more than ten thousand inland vessels have been registered in Department of Shipping (DOS). Apart from fifty thousands of mechanized and manually operated country boats have not yet come under the preview of registration and organized statistics. There are more than five hundred coastal ships have been registered with Mercantile Marine Department (MMD). To get the real number of vessel actually build in local shipyard is quiet more than the registered either in DOS or in MMD.

At present there are few private shipyards already have developed international standard and have received new building order to manufactured world-class ships for foreign countries. Among them, Ananda Shipyard and Slipway Ltd (ASSL), Dhaka, Western Marine Shipyard (WMS), Chattogram, Karnophuli Shipyard and Slipway Ltd (KSSL), Chattogram, and KSY Ltd, Khulna have attained the capability to construct ships around 10000 DWT. ASSL and WMS has already constructed and exported few dozen of small and medium merchant ships to foreign (Europe, Africa and Asia) destination. ‘World ship owners are slowly but surely entering Bangladesh with hope and trust to local shipyards. So, it is expected that our local shipyards will improve their capability and shipbuilding quality to attained global standard’.²¹

Only few local shipyards have found to be careful and attitude to improve quality, health, safety, and environmental (QHSE) aspects, which are again at average level. Pressure from the government and the foreign buyers together with the awareness program and training on QHSE aspects will lead the local Shipyards to international ones. Most of the local shipyards are very reluctant to follow

²¹ K A Hossain and M N G Zakaria, “A Study of Global Shipbuilding Growth Trend and Future Forecast”, Procidia Engineering, Elsevier, 2017.

corporate management culture. Family members occupy the important managerial appointment. Such family management culture is one of the hindrances for development of the shipbuilding. For example ASSL, has failed to continue their success in ship export business due to family management culture. We need to change our attitude like “get rich quickest way possible”. We need to improve our mentality to a more sustainable way. For example WMSL has failed to continue their success in ship export business due to their attitude to get rich in quickest way. Unfortunately they invest to other business in the ambition to become rich easily and quickly. Business consistency and sustainable way of doing business is the main tools of success in shipbuilding business.

There is no corporate management culture practiced in local Shipyards. Poor job satisfaction observed among the middle level management and skilled workforce. Workforce merely enjoys industrial benefit, like production bonus, and fringe benefit; not enjoys labor welfare activities like medical, pension, travel or daily allowance, accident and other compensation. Main workforce is employed in casual basis. Local shipyards owners do not bother about working environment and welfare of the employees due to abundance of cheap labor in local job market. As a result, substantial number of graduates and other skilled manpower trained in maritime industry leave frequently from local private shipyards for overseas employment.

Additional financial cost of local Shipbuilding is about 10 to 20% higher than the other competing nations like China, Korea, Japan, India, Vietnam, etc. High price and shortage of electricity and gas supply as well as other poor infrastructure are major obstruction, which hinders the setting up shipbuilding industries in Bangladesh. Relatively poor state diplomacy, country image and lack of activities to promote local shipbuilding are creating obstacle to growth of this promising industry. The government allocation of Annual Development Program (ADP) for waterways and water transport is below 4%, whereas for road is above 70%. Local shipbuilding industry is still at a vulnerable stage; need so many things to do, to develop into international and competitive standard. If this sector get same facilities as given to the RMG sector, the net benefit will be better in comparison to that of RMG.

Suitable Market for Local Shipbuilding

To find out the suitable market, help has been taken from empirical research and the outcome has based on quantitative and qualitative data collection

methods. The data and information have also been collected from Focused Group Discussion (FGD) those are working on board different types of merchant ships around the world and at various shipping companies of Bangladesh. Size of global shipbuilding market is around USD 200 billion, where small ship building market is around USD 20 billion. There is a serious demand of container ships in all size. UNCTAD, WB, WTO, and OECD have detected the high demand of container ships in coming days ahead.

Small niche shipbuilding market is suitable for local shipbuilders. In coming future, the world will need few thousand of vessels, mostly small to medium sized. Old single hull tanker fleet will be replaced totally and immediately as per IMO requirement. And it has been discovered that, small and medium size container, tanker, cargo, multipurpose and special types of ships with 3000-10000 dwt (approx) is suitable for Bangladesh. Bangladesh has all potential and capacity to capture this niche market with competitive price. Bangladesh has all potential and capacity to get 1% of global market share within next couple of years and that worth will be USD 2 billion per year. Moreover, very recently the opportunity of FDI has created in shipbuilding sector. Country like China, Turkey, and Netherlands has showed their keen interest in this sector.

The sea area of Bangladesh is of enormous importance, because it is the only way of direct connectivity to the rest of the world. Constant presence of BN and BCG are imperative for keeping the sea lanes of communication secured, establishing and maintaining the sovereign rights over our 118813 sq km sea areas and economic benefit of the country. In order to avert any threat to national security by 'traditional' and 'non-traditional' means both the organizations remain vigilant by deploying ships at sea. So, a good number of military ships are required for operational tasks both in peace and wartime. And that is also a local niche market for BN operated private shipyards along with huge local inland and coastal fleet. In future we need to develop our own merchant fleet to maintain our export and import business of cargo, energy and other goods. There will be another local niche market for us.

Conclusion

By trend analysis of global shipbuilding industry, we found that, Japan had been the dominant ship building country from 1960s through to the end of 1990s but gradually lost its competitive advantage to the emerging industry in South Korea which had the advantages of much cheaper labor wages, strong government backing and a cheaper currency. The market share of European ship builders began

to decline in the 1960s as they lost work to the Japanese in the same way as Japanese ship-builders have lost work to South Koreans in 2003. China becomes the global shipbuilding leader since 2010 leaving behind Korea and Japan by utilizing their abundance of cheap labor and favourable government policy. However, four local shipyards of Bangladesh have capable to build around 10000 DWT export quality ships. It has been predicted that, at future, China will leave a portion of their small and medium shipbuilding market share.

Cheap labor alone cannot be the only factor for sustainable development of shipbuilding. Nowadays advance technology can save cost and there is a chance to lose our competitiveness, if we rely only on labor cost. Actually, Bangladesh can make a huge economic progress by properly nourishing and utilizing our export oriented shipbuilding industry. Entrepreneurs have also confident on good prospect of local shipbuilding industry. Bangladesh is taking the advantages of its long history of maritime activity, favorable geographical location and availability of cheap workforces. Export oriented shipbuilding is truly a global industry. Bangladeshi-made ships of international standard are roughly 10%-30% less costly than ships made in Japan, Korea, China even Vietnam or India. Considering present opportunities and future challenges, local shipbuilding industry may formulate and adopt a viable policy and consequent strategies. At the same time optimizing the local shipbuilding capacity and explore the suitable shipbuilding market is also essential. It may be the sustainable way to revitalize the lost splendor history of local shipbuilding.

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THE EVOLVING STRATEGIC ENVIRONMENT IN THE INDO-PACIFIC REGION: THE NEED FOR A NAVAL DOCTRINE OF BANGLADESH

Professor Shahab Enam Khan, PhD

Abstract

Once again, the Cold War syndrome is back in the international strategic environment. The complex strategic relations between the US and China have emerged as a critical factor constantly reshaping geopolitical and geostrategic stability in the Indo-Pacific region. The Bay of Bengal, being a part of the Indo-Pacific region, is now witnessing an unprecedented interest from the global power to project their military and diplomatic strengths. Given the militarization of the Indo-Pacific waters and the geostrategic rivalries unfolding in the Bay of Bengal – a vital sovereign jurisdiction of Bangladesh, the necessity for strengthening Bangladesh's naval power has never been as critically important as of now. Like the Balkans a century ago, riven by overlapping alliances, competitions, and rivalries, the strategic environment in the Indo-Pacific and the Bay of Bengal regions will only become complex and hostile in the future. To secure Bangladesh's strategic autonomy and to reduce the impacts of global power rivalries over the Bay of Bengal, it is high time for Bangladesh to develop its naval doctrine. The critical powers, i.e., the US, China, Russia, Japan, and Australia, are now rethinking their naval doctrines. Henceforth, Bangladesh's naval doctrine should be aimed at embracing the rapid changes in geopolitics, peace, stability in the region, and technological advancements in the maritime domain. A doctrine, therefore, would give the international community a better sense of security and how Bangladesh's armed forces would act in a hostile geostrategic situation.

Keywords: Cold War, Doctrine, Realism, Sea Power, Strategic Autonomy, Technopolar

Background

Bangladesh is at a geopolitical crossroads. Understanding geopolitics from the prism of Dhaka has never been as complex as ever in its recent history. The world has been observing, rather than watching, two events unfolding and evolving in Ukraine and Taiwan with apprehension, dismal political and diplomatic limitations, and fear of the return of the Cold War backed by new tools

like algorithms, artificial intelligence, and unmanned and biological technologies. Hence, a new political world is in the making, led by two distinct but fluid blocs – the US and its allies and China and its comrades. Both the test cases in international cases, the Ukraine crisis led by Kremlin, Moscow, and Taiwan tension led by Washington, USA, have shaken the foundations of multilateralism, liberal political order, and international stability – both in the forms of strategic and financial. Kremlin's calculated attack on Ukraine has caused a large humanitarian catastrophe that has generated convulsion across Europe, once an abode of liberalism, civilizational development, and supranational institutions like NATO and the EU. Beijing's response to Taiwan has sent a clear message of deeper polarization than can continue to keep the Indo-Pacific region susceptible to the global power struggle for power. Unsurprisingly, diplomatic and military miscalculations, or even a military accident, e.g., caused by nuclear submarines or a military aircraft, will have disastrous effects on the growth and development processes.

These crises have come at a moment when the adverse aftermath of the COVID-19 pandemic has been felt across the continents, and its residual effects keep the global economy fragile. However, the countries are slowly returning to normalcy. In between, Bangladesh, in its immediate neighborhood, is feeling the heat of a state-level economic turmoil in Sri Lanka, nosedived economy in Pakistan, the continued rise of ultra-nationalist rightist politics in Bangladesh's two immediate neighbors, India and Myanmar, failures in China's zero-COVID policy, return of Taliban 2.0 in Afghanistan along with the renewed presence of the US-Pakistan tacit ties to counter Al Qaeda and ISKP, and competing strategic interests of the two global powers, China and the US, in the Bay of Bengal. The events in the extra-regional settings, such as the energy crisis and the looming food crisis, competition to control the global sea lines of communication and freight movement, global climate change, and Iranian and North Korean nuclearization, led to more significant military expenditures for the major powers. In addition, public health and technological disparities have gotten countries like Bangladesh to infuse extra resources to sustain economic growth. That means quantitative easing (QE) will become a phenomenon and near mandatory as a policy response to financial crises. Such phenomena have their flip sides, too - greater borrowing and spending, mixed with supply issues, will compel the nations to embrace inflation.

While the unfolding global precedence and evolving events are not soothing for the statist realists or the structural liberalists, the Washington-Beijing relationship will redefine geopolitics and geoeconomics in the coming years. The

US Indo-Pacific Strategy (IPS), published in February 2022, denotes “the centrality of the region to core US interests and its forthright characterization of challenges posed by China”.¹ The 2022 version of IPS differs from the one pursued by the Trump Administration. The Biden Administration focuses on greater cooperation with regional allies and flags the necessity to bolster economic presence through an Indo-Pacific Economic Framework (IPEF) that seeks to limit China’s economic, technological, and foreign-policy dominance in the region.² Beijing has intensified its “military basing pursuits” to the South Pacific and Indian Ocean, seeking to establish its strong foothold in the Bay of Bengal. The People’s Liberation Army (PLA) has already made substantial headway in securing new bases in new destinations such as Cambodia, Tanzania, and the United Arab Emirates, among other locales.³

The Chinese military presence became more intensified after US House Speaker Nancy Pelosi visited Taiwan in August 2022. The visit prompted China to conduct unprecedented military drills, highly aggressive diplomatic and political steps, and foreign policy pressures on the Indo-Pacific countries. As a result, the region became polarized between the countries that overwhelmingly upheld Beijing’s “One China” principle and the key US allies that strongly support Taiwan’s cause.⁴ Meanwhile, the emergence of the so-called military and technology pact among Australia, the US, and the United Kingdom (AUKUS) has raised the Indo-Pacific region’s geopolitical stakes to a higher level. China sees the AUKUS as another military, more precisely naval, red flag, and the ASEAN countries view it as a conduit for further militarization of the region. Choong and Seah (2021) mentioned, “the same goes with the Quadrilateral Security Dialogue-known as the Quad. In August and October 2021, the four Quad members’ navies conducted maritime exercises in the Philippine Sea and the Bay

¹ The White House, "Indo-Pacific Strategy." February N/A. March, 2022, Available at: <https://www.whitehouse.gov/wp-content/uploads/2022/02/U.S.-Indo-Pacific-Strategy.pdf>. Also see, Carla Freeman, Daniel Markey, and Vikram J. Singh, “A Closer Look at Biden’s Indo-Pacific Strategy”, Washington DC: United States Institute of Peace, 2022.

² Robert D Atkinson, "Biden’s Indo-Pacific Economic Framework Is a Paradigm Shift", Foreign Policy, 01 July 2022.

³ Dennis Hardy, "Repositioning the Bay of Bengal: Implications of Regional Change", Journal of the Indian Ocean Region, 2019, p. 1-16.

⁴ Derek Grossman, "After Pelosi’s Visit, Most of the Indo-Pacific Sides With Beijing", Foreign Policy, 22 August 2022.

of Bengal, respectively. As a testament to these drills' growing importance, the United States announced plans to possibly include Britain's Royal Navy in the future".⁵

The snapshot mentioned above reminds us that the core of our understanding of geostrategic structure is increasingly changing, where variables such as access to information, unpredictable and disruptive technologies, and evolving military strategies are playing key roles. The state no longer holds the monopoly over data and information, and technology allows unprecedented level surveillance on the public and the state, changing the armed forces' strategic behavior and autonomies. The relationship between military-technology superiors and geostrategic rivals, particularly in the domain of maritime dominance, will arguably remain the most critical and contested geopolitical complex and dynamics over the coming years, with intensified strategic competitions geared toward diplomatic and defense counter-moves and greater support for strategic industries.⁶ In this structure, "controlling of the Indo-Pacific waters is one of the main approaches behind geostrategic rivalries among the great powers."⁷ Once again, Alfred Mahan's Sea power theory returns, which stresses that supremacy at sea was essential for a nation's political and commercial success.⁸ In essence, Mahan's doctrine stated that: (1) The United States should be a world power; (2) Control of the seas is necessary for world power status; (3) The way to maintain such control is by a powerful Navy.⁹

Henceforth, paradigm-altering unpredictable equations and their domino effects have undoubtedly asserted pressures on Bangladesh's foreign policy choices, economic stability, strategic priorities, and national security policymaking. What this means, then, is the unpredictability in global political

⁵ Willian Choong and Sharon Seah, "Why AUKUS Alarms ASEAN", Foreign Policy, 19 October 2022.

⁶ Thomas Mucha, "Geopolitical Outlook: Turbulence Ahead?", 22 June 2022, Available at: <https://www.hartfordfunds.com/insights/market-perspectives/global-macro-analysis/geopolitics-in-2022-turbulence-ahead.html>.

⁷ Iain D Henry, "What Allies Want: Reconsidering Loyalty, Reliability, and Alliance Interdependence", *International Security*, vol 44, no. 4, 2020, p. 45-83.

⁸ Alfred Thayer Mahan, "The Influence of Sea Power Upon History, 1660-1783", First. Boston: Little, Brown and Company, 1890.

⁹ H Kaminer Manship, "Mahan's Concepts of Sea Power: A lecture delivered at the Naval War College on 23 September 1963", *Naval War College Review*, vol 16, no. 5, 1964, p. 15-30.

ecosystems, which directly impacts political and foreign decision-making processes. Hence, the need for a well-articulated naval doctrine for Bangladesh has become a critical feature of the defense discourse. Even if one takes Mahan's Sea Power Theory into cognizance or resorts to the geostrategic rivalries unfolding in the Bay of Bengal – a vital sovereign jurisdiction of Bangladesh, the necessity for strengthening Bangladesh's naval power has never been as critically important as now in its five decades of independence.¹⁰ Like the Balkans a century ago, riven by overlapping alliances, competitions, and rivalries, the strategic environment in the Indo-Pacific and the Bay of Bengal regions will only become complex and hostile in the future.¹¹ Henceforth, this article has been written to add value to defense discourse, alliance narratives, and as an apt reminder that the country should adopt its clear sea doctrine without delay. Bangladesh cannot afford to see the Balkanization of the Bay of Bengal.

The Geo-Geo Complexities in the Indo-Pacific and the Bay of Bengal Waters

The Bay of Bengal is a classic case of blurring space between geopolitical and geostrategic realities. The Bay of Bengal littoral countries have to balance among development trajectories, human development, macro and micro economic stability, and rising income disparities.¹² These are the key variables that define, at least in the case of Bangladesh, to determine and design its geostrategic responses to the changing global orders. Hence, the polarization in the international political environment and the Cold War syndrome in the unpredictable Indo-Pacific region constantly put pressure on Bangladesh's foreign relations and defense postures. The Ukrainian and Taiwanese experiences show the difficulties in predicting a diplomatic breakthrough (in the case of Taiwan) or any significant military de-escalation (in the case of Ukraine); in the short term, political and economic sanctions are likely to continue and expand.

While the conflict in Ukraine is not the only security emergency the world is facing, and it is impactful because of its far-reaching effect on global security

¹⁰ Alfred Thayer Mahan, 1890.

¹¹ Kevin Rudd, "A Maritime Balkans of the 21st Century? East Asia is a tinderbox on water", Foreign Policy, 30 January 2013.

¹² David Brewster, "A rising Bangladesh starts to Exert its Regional Power", 10 June 2021, Available at: <https://www.lowyinstitute.org/the-interpreter/rising-bangladesh-starts-exert-its-regional-power>.

and prosperity in a technopolar world system.¹³ That means the countries will continue to struggle for power (in the case of military superiors), economic stability (in the case of developing countries), and existence (in the case of small states). Once again, a harsh history of the Cold War returns as the Cold War 2.0 in the Indo-Pacific region. Kraska and Wilson (2009) argued, “following the Cold War, the littorals have emerged as the primary maritime battleground for peace and stability.”¹⁴ The seas have further become a domain to exercise “lawfare” in addition to traditional “warfare.” The Bay of Bengal is increasingly becoming a strategic and economic battleground for both “lawfare” and “warfare,” as seen in the backgrounder of this article.

However, Bangladesh’s naval and maritime importance is complex. While the world is now struggling with multiple crises or perhaps unfolding new threats, we are seeing responses from the non-state actors intensifying too. The rise of extremism, which is a perennial problem for the states – in the forms of Islamist reactionary forces, saffron Hindutva, Buddhist ethnonationalism in Myanmar, or even ultra-right supremacist nationalism in the US and Europe – continues to be a significant security verbatim in defining ethnic and political relations.¹⁵ Bangladesh, in its neighborhood, is observing a crisis of secularism that has potential spillover effects that can make the region volatile. Bangladesh now hosts the largest refugee camp in the world in Cox's Bazar, hosting 600,000 Rohingya refugees (officially known as Forcibly Displaced Myanmar Nationals) from the Rakhine state of Myanmar. In total, Bangladesh hosts 980,000 Rohingyas who fled the genocide committed by Tatmadaw in August 2017.¹⁶ Unfortunately, the global powers are divided on responding to the genocide committed in Myanmar.

¹³ KPMG International, “The geopolitical impact of the conflict in Ukraine”, Washington DC: KPMG International, 2022.

¹⁴ James Kraska and Brian Wilson, "China wages maritime “lawfare”", Foreign Policy, 12 March 2009.

¹⁵ Cynthia Miller-Idriss, "How Extremism Went Mainstream Washington Needs a New Approach to Preventing Far-Right Violence", Foreign Affairs, 2022.

¹⁶ UNHCR, “Rohingya Refugee Crisis Explained”, New York: UNHCR, 2022.

However, the US has formally recognized the atrocities and lethal crimes committed by Tatmadaw as genocide.¹⁷

The key obstacle has been the opposition from China and Russia in the UN Security Council with veto powers and India's national security priority, which is plagued with cross-border insurgencies in its Northeastern region. However, in an unprecedented move, on August 6, 2022, foreign ministers from the 10-member Association of Southeast Asian Nations (ASEAN) agreed to bar Myanmar's ruling generals from the group's meetings until they make progress on a 15-month-old plan to address the crisis triggered by the military coup.¹⁸ China and Russia see the Myanmar-Bay of Bengal connection as a vital source of geopolitical rivalries between the US-led and the non-US-led blocs. Rakhine has emerged as a geopolitical spindle between South and South Asia, an imminent point of interest for the global powers competing for geostrategic firm footing in the Indo-Pacific waters.

However, Rakhine is a blind spot for China as it serves its access to the Bay of Bengal through Myanmar. China shares a 2,129 km border with Myanmar that runs from the tripoint with India in its north to the tripoint with Laos in the South.¹⁹ Hence, on the Southern Chinese side, particularly for Yunnan and as an alternative to Malacca Strait, Rakhine has become a strategically vital landmass for Beijing and PLA.²⁰ On the other hand, for India, Rakhine remains a strategic

¹⁷ Alexandra Sharp, "The U.S. Has Recognized Myanmar's Genocide. But Is That Enough?", 2022 Available at: <https://foreignpolicy.com/2022/03/24/myanmar-genocide-rohingya-us-recognition/>. US Department of State, "U.S. Security Cooperation with Bangladesh", 2021, Available at: <https://www.state.gov/u-s-security-cooperation-with-bangladesh/>. Also see, "The United States Announces New Assistance to Respond to the Rohingya Humanitarian Crisis", 2021, Available at: <https://www.state.gov/the-united-states-announces-new-assistance-to-respond-to-the-rohingya-humanitarian-crisis/>.

¹⁸ AlJazeera, "Myanmar generals banned from ASEAN until peace plan progress.", 06 August 2022, Available at: <https://www.aljazeera.com/news/2022/8/6/myanmar-generals-banned-from-asean-until-peace-plan-progress>.

¹⁹ Central Intelligence Agency, "The World Factbook: Burma", 08 August 2022, Available at: <https://www.cia.gov/the-world-factbook/countries/burma/>.

²⁰ Yann Roche, "La Mer de Chine méridionale un enjeu frontalier majeur en Asie du Sud-Est (The South China Sea: a Major Frontier Issue in Southeast Asia)", *L'espace Politique*, vol 21, no. 3, 2013, Available at: <https://journals.openedition.org/espacepolitique/2780>

region for alternative sea and surface supply lines for the landlocked Northeast India, connectivity between India and the Southeast Asian countries, and combating insurgencies. As a result, both countries have invested substantially in Rakhine.

However, Myanmar's volatility and the global power rivalries in and around the Bay of Bengal refer to the making of an arc of stability from Singapore to Bangladesh to India to the islands of Sri Lanka and the Maldives.²¹ The binding domain here is the Bay of Bengal, as the former the US Deputy Secretary of State, Mr. Stephen Biegun, during his visit to Dhaka in October 2020, mentioned that "Bangladesh will be a centerpiece of our work in the region".²² The Japanese Ambassador to Dhaka Ito Naoki mentioned – "Bangladesh, located in the Bay of Bengal, is a vital country in geopolitical terms, and it needs to utilize its geographical advantage to increase economic opportunities fully".²³ The Chinese Ambassador to Dhaka Li Jiming, highlighting the growing strategic positioning in the Indo-Pacific waters, wrote an article in which he mentioned: "It is highly expected that the PLA and Bangladesh Armed Forces continue to strengthen exchanges and cooperation, and jointly write a new chapter on safeguarding world peace & development, and building a community with a shared future for mankind".²⁴

²¹ K. W. Chern, "More Indian investments expected with better connectivity, bilateral ties", Myanmar Times, 15 July 2019, Available at: <https://www.mmtimes.com/news/more-indian-investments-expected-better-connectivity-bilateral-ties.html>. Also see, D. S Mathieson, "Balkanization of Burma?" Irrawaddy, 2008, Available at: https://www2.irrawaddy.com/article.php?art_id=11644&page=1.

²² Shahab Enam Khan, "The Bangladesh-US Bilateral Relations: Rethinking through the Blurring Space between Geopolitics and Geoeconomics in the Indo-Pacific Region", AmCham, vol 15, no. 3, 2021, p. 17-26. US Embassy in Dhaka. Remarks by Deputy Secretary of State Stephen Biegun, 2020, Available at: <https://bd.usembassy.gov/remarks-by-deputy-secretary-of-state-stephen-biegun/>.

²³ The Business Standard, "Bangladesh strategically vital in Indo-Pacific", 28 February 2022, Available at: <https://www.tbsnews.net/bangladesh/bangladesh-strategically-vital-indo-pacific-377905>.

²⁴ Li Jiming, "Ambassador Li Jiming Publishes an Op-ed Titled "The PLA: A Staunch Force to Safeguard the World Peace and Development", 2022, Available at: http://bd.china-embassy.gov.cn/eng/dshd/202207/t20220731_10730895.htm.

Ambassador Jiming's article came at a time when the US released its new Indo-Pacific Strategy and Indo-Pacific Economic Framework, "the Quad" – an alliance of four Indo-Pacific countries such as Australia, India, Japan, and the US has been formed – and the AUKUS became a source of trilateral tension among China, France, and the AUKUS members.²⁵ The Chinese Ministry of Foreign Affairs issued a statement: "The logic behind the US Indo-Pacific strategy, AUKUS, the Quad grouping, and the latest Indo-Pacific Economic Framework is US' centrism' and 'exceptionalism'.²⁶ The statement further mentioned that the bilateral relations could be "substantially damaged" in case Bangladesh decides to join the Quad, which China deems as "a military alliance aimed against China's resurgence and relationship with neighboring countries".²⁷

While the US-China conundrum continues to influence Bangladesh's foreign and defense policy choices, its relations with India remain an essential geopolitical and geostrategic focus for China, the Quad alliance, and a diverse range of Indo-Pacific Strategies pursued by the US, Japan, and Australia. During the visit of Indian Prime Minister Narendra Modi to Dhaka on March 27, 2021, the issue of stability in the Indian Ocean was highlighted. In a joint statement issued on the occasion of the visit of the Prime Minister of India to Bangladesh, the Prime Ministers of Bangladesh and India agreed to strengthen cooperation in the maritime domain. The joint statement states: "Bangladesh side highlighted that the country would assume chairmanship of the IORA for the first time in October 2021 and requested the support of India for working towards greater maritime safety and security in the Indian Ocean region. Prime Minister Narendra Modi congratulated Bangladesh and assured India's cooperation in this regard".²⁸

²⁵ The White House, "Indo-Pacific Strategy", February 2022, Available at: <https://www.whitehouse.gov/wp-content/uploads/2022/02/U.S.-Indo-Pacific-Strategy.pdf>.

²⁶ Radio Free Asia, "China takes dig at US as it again warns Bangladesh against Quad", 03 June 2022, Available at: <https://www.rfa.org/english/news/china/bangladesh-diplomat-06032022170832.html>.

²⁷ Ibid. Also see, UNB, Dhaka, "Relations with China will be damaged if Bangladesh joins US-led 'Quad': envoy", The Daily Star, 10 May 2021, Available at: <https://www.thedailystar.net/bangladesh/news/relations-china-will-be-damaged-if-bangladesh-joins-us-led-quad-envoy-2091345>.

²⁸ Ministry of External Affairs, Government of India, "Joint Statement issued on the occasion of the visit of Prime Minister of India to Bangladesh", 27 March 2021, Available at: <https://mea.gov.in/outgoing-visit-detail.htm?33746/Joint-Statement-issued-on-the-occasion-of-the-visit-of-Prime-Minister-of-India-to-Bangladesh>.

Bangladesh's Geopolitical and Geostrategic Concerns

While the statements mentioned above clearly reflect intensified geostrategic interests of the global and regional powers evolving around the Bay of Bengal, Bangladesh's challenges lie in the military presence of the great powers in the Bay of Bengal littoral water. These challenges are linked to geostrategic interests, national security, and the political economy around the Bay of Bengal. The Sri Lankan economic turmoil is a harsh reminder of the blurring space between geopolitics and geoeconomics. Sri Lanka, a Bay of Bengal country, suffered a devastating economic collapse, allowing Bangladesh to observe a new geopolitical environment. The IMF is negotiating with the Sri Lankan government to arrange for a sustainable bailout which will require political stability, unpopular austerity measures, restructuring of debt profile, and emending infrastructure projects. The much-debated Hambantota port and the Colombo port city came under the geostrategic radar of the powers, which has further intensified Chinese concerns over the Indian Ocean waters. On August 07, 2022, as Reuter reported, "Sri Lanka has asked China to defer the planned visit of a Chinese survey ship to the island country after an objection from India".²⁹

The Reuter report further noted, "India worries that the Chinese-built and leased port of Hambantota will be used by China as a military base in India's backyard. The \$1.5 billion port is near the main shipping route from Asia to Europe".³⁰ The event marks the making of a more profound strategic polarization in the Indian Ocean and the Bay of Bengal region. According to international maritime law, the Chinese survey ship Yuan Wang 5 has the right to dock at the Hambantota Port. At the same time, Maldives National Defense Force has allowed five Indian vessels in Maldivian waters to conduct a joint hydrographic survey with the Maldivian government.³¹ The presence of the Indian survey vessels has sparked political polarization in the Maldives, deeply rooted in anti-China or anti-India blocs. Subsequently, it has further made the Chinese approach to the Indian Ocean more combative. While we are witnessing militarization, or in a

²⁹ Reuters, "Sri Lanka asks China to defer arrival of ship after India objects", 07 August 2022, Available at: <https://www.reuters.com/world/asia-pacific/sri-lanka-asks-china-defer-arrival-ship-after-india-objects-2022-08-07/>.

³⁰ Ibid.

³¹ Avas, "Five Indian vessels in Maldives for hydrographic survey", 07 May 2022, Available at: <https://avas.mv/en/117653>.

softer way to say 'securitization,' of the Indo-Pacific waters, Bangladesh's approach to the Indian Ocean, or the Indo-Pacific waters as a whole, has so far been neutral.

Indian intelligentsia has raised concerns over Bangladesh's procurement of Chinese Ming-class submarines. Bangladesh has reminded the strategic partners and powers that Bangladesh had to resolve its maritime disputes through international legal systems and institutions.³² The maritime demarcation was not achieved through bilateral mechanisms with India and Myanmar; instead, it has been peacefully resolved through the International Tribunal for the Law of the Sea (ITLOS) and the Permanent Court of Arbitration (PCA). Bangladesh has not positioned itself as a member of any strategic alliances to transform the Bay of Bengal as a liberal investment destination for the international community while retaining absolute "strategic autonomy" and "control" over its maritime territory.³³ US Ambassador to Dhaka has mentioned, "by committing to the peaceful resolution of its land and maritime border disputes, Bangladesh has made the Bay of Bengal an example for the world to follow".³⁴

Undoubtedly, Bangladesh's peaceful defensive posture continues despite Myanmar's Tatmadaw (the military junta in power), a significant source of national security threats to Bangladesh, acquiring a Russian-built Kilo Class submarine from India. In fact, just an anecdote, China, procured eight new Kilo-class diesel submarines from Russia in May 2002.³⁵ Bangladesh needs to strengthen its armed forces, more precisely the naval forces, to deter and diffuse threats of military escalations from the unpredictable government in Myanmar or insurgent activities in the Rakhine state. Honorable Prime Minister Sheikh Hasina reiterated that "the government was very much cautious to avert any kind of war with Bangladesh's

³² Shahab Enam Khan, "The New Geopolitical Reality in the Bay of Bengal: Implications of Competition and Cooperation on Bangladesh-Sri Lanka Bilateral Relations", *Defence Review* (Institute of National Security Studies), 2020, p. 46-59.

³³ Shahab Enam Khan, "The Emerging Regional Power Dilemma in the Indo-Pacific Region: Bangladesh and Sri Lankan Perspectives", *Journal of Defence and Policy Analysis*, vol 1, no. 1, p. 16-28.

³⁴ US Embassy in Bangladesh, "U.S. Ambassador Peter Haas's Remarks at the International Conference on Moving Forward in the Indo-Pacific", 31 March 2022, Available at: <https://bd.usembassy.gov/u-s-ambassador-peter-haas-remarks-as-prepared/>.

³⁵ Lyle Goldstein and William Murray, "Undersea Dragons: China's Maturing Submarine Force", *International Security*, vol 28 no. 4, 2004, p. 161-196.

neighbor despite repeated provocations from Myanmar." The Prime Minister mentioned: "Our nearest neighbor, at one point, showed such an attitude that there will be a war with us".³⁶ Therefore, the strategic posture and the commitment toward the peaceful Bay of Bengal should be seen as a source of both strategic and economic security.

A Naval Doctrine for Bangladesh to Respond to the Evolving Strategic Environment

The Bay of Bengal has become a critically potential source of sustainable energy and food security, most notably after the Ukraine crisis, and a supply line vital for Bangladesh's graduation to the Least Developed Country (LDC) category in 2026. The United Nations Committee for Development Policy (CDP) has confirmed that Bangladesh is eligible to exit from the Least Developed Country category, having crossed the threshold of three defining criteria, namely per capita GNI, Economic and Environmental Vulnerability Index (EVI), and Human Assets Index (HAI).³⁷ Bangladesh's foreign and economic policies are required to intensify investment, of course, by ensuring environmentally sustainable and safe for the marine ecosystem in the Bay of Bengal. It should be noted that "the deep sea, the vast expanse of the world's oceans beyond the continental shelf, is at risk of conflict and competition. The fact is, even the cold, dark reaches of the ocean are no longer immune to resource competition between the world's major powers".³⁸

The seas are now being seen through a combination of technological advances, rising demand for fish and rare minerals, and an under-developed institutional framework making the deep sea the planet's latest – and perhaps last – frontier for those concerned with preventing future conflict.³⁹ The International

³⁶ UNB, Dhaka, "PM Hasina: Govt was cautious against provocation of war with Myanmar", Dhaka Tribune, 07 October 2022, Available at: <https://archive.dhakatribune.com/bangladesh/2017/10/07/pm-hasina-govt-cautious-provocation-war-myanmar>.

³⁷ Debapriya Bhattacharya, "Bangladesh qualifies for LDC graduation: What next?", Financial Express, 11 March 2021, Available at: <https://thefinancialexpress.com.bd/views/bangladesh-qualifies-for-ldc-graduation-what-next-1615473209>.

³⁸ Scott Moore and Dale Squires, "Deep Trouble: Emerging Resource Competition in the Deep Sea", Washington: Wilson Center, 2016.

³⁹ Scott Moore and Dale Squires, "Governing the Depths: Conceptualizing the Politics of Deep Sea Resources", *Global Environmental Politics*, vol 16, no. 2, 2016, p. 101-109.

Seabed Authority (ISA) has entered into 15-year contracts to explore polymetallic nodules, polymetallic sulphides, and cobalt-rich ferromanganese crusts in the deep seabed with 22 contractors.⁴⁰ These explorations will be performed in Clarion-Clipperton Fracture Zone, Central Indian Ocean Basin, Western Pacific Ocean, South West Indian Ridge, Central Indian Ridge, Mid-Atlantic Ridge, and Western Pacific Ocean.⁴¹

The contracts and exploration drives have redefined the geopolitics of ocean governance. The ocean's governance has to be understood as "a function of its significance for life and functioning of ecosystems, its 'unique materiality – heavy, fluid and yet fixed in place and its ability to shift between different physical states – solid, liquid and gas'.⁴² That means the human activities, or deployment of technologies, will significantly influence inter-state relations, resource competition, and political geography centering around the seas. Thus, the deep seas now, on the one hand, "stand at the threshold of becoming a matter of politics; it has provoked a wide range of geopolitical imaginaries variously relating to 'resource security' and 'progress', on the one hand, and environmental disaster and precaution on the other".⁴³ Henceforth, rethinking the political, security, and alliance approaches toward the Bay of Bengal have become an essential security priority for emerging economies such as Bangladesh.

As we speak for rethinking the territorial waters, political and economic structures of the governance of the seas are fundamentally changing. The significant powers with access to seas are now rethinking their naval doctrines. Therefore, it is high time for Bangladesh to develop its naval doctrine. This article shows an increasing acknowledgment of the economic importance and future potential of the Bay of Bengal, often framed in terms of the 'blue economy' concept and the context of great power involvements.⁴⁴ The role of the human element and

⁴⁰ International Seabed Authority, "Exploration Contracts", 2019, Available at: <https://www.isa.org.jm/exploration-contracts>.

⁴¹ Ibid.

⁴² A. Calrke-Sather, B. Crow-Miller, JM Banister, K Anh Thomas, ES Norman and SR Stephenson, "The Shifting Geopolitics of Water in the Anthropocene", *Geopolitics*, vol 22, no. 2, 2017, p. 232-359.

⁴³ John Childs, "Extraction in Four Dimensions: Time, Space and the Emerging Geo(-)politics of Deep-Sea Mining", *Geopolitics Open Access (Online)*, 2018, p. 1-25.

⁴⁴ M G Hussain, P Failler, M Khurshed Alam and A Al Karim, "Major opportunities of blue economy development in Bangladesh", *Journal of the Indian Ocean Region*, vol 14, no. 1, 2018, p. 88–99.

the complex defense-technological systems will continue to be transformed and redefined by technological advancement. These advancements will significantly influence the naval doctrines over the years to come. Although, of course, it is notable that the autonomous operations and advanced maritime surveillance to determine "sea denial" and "sea control" is still in the infancy for the South Asian countries, Bangladesh's Naval Doctrine should focus on four inter-linked dimensions of naval geopolitics – (i) Principles of War, Peace, and Governance; (ii) Capacity and Capacities; (iii) Maritime Combat Power and Operations; (iv) Awareness, Understanding, and Cooperation; (v) Strategic Autonomy and Control; (vi) Training, Development and Modernization; (vii) International and Regional Governance; and (viii) Protection of Marine Ecosystems and Environment.

The Doctrine, henceforth, should be able to embrace the rapid changes in geopolitics and technological advancements. In terms of strategic considerations, Bangladesh's Doctrine should spell out clear priorities and goals of the Bangladesh navy in line with the economic and national security interests of the country, protecting Bangladesh in the event of a conflict and deterring adversaries from initiating and executing hostile actions, develop early warning mechanisms, effective control of sea lanes of communication, ensuring maritime border defense including underwater, modernization of naval command and control systems, political aspects such as joint exercises and operations, and calculated participation in maritime security cooperation forums.

In terms of economic considerations, the Doctrine should be synchronized with the Forces Goal 2030, foreign policy, protection of offshore investment, technology transfer and indigenous manufacturing of naval vessels, research and development using both external and internal resources, and protection of maritime ecosystems and environment. That means the Doctrine must be able to facilitate a combination of a high level of readiness with the ability to deploy in any part of the Bay of Bengal and the Indian Ocean and neutralize threats through a preemptive strike or other conventional attacks. Furthermore, to further exercise strategic autonomy, the Bangladesh Navy may be required to expand its naval capabilities by increasing its strengths in ballistic missile submarines and transforming its conventional naval capabilities into strategic deterrence capacity.⁴⁵ That means a modern Navy should focus on procuring the full range of possible maritime equipment, including multipurpose nuclear and conventional

⁴⁵ Dmitry Gorenburg, "Russia's New and Unrealistic Naval Doctrine", 26 July 2017, Available at: <https://warontherocks.com/2017/07/russias-new-and-unrealistic-naval-doctrine/>.

submarines, multipurpose surface combat ships, naval aviation, coastal defense forces, and even ground effect vehicles over the period.⁴⁶

Concluding Remarks

In conclusion, one may recall Michael Brown's (2004) epic statement: "Whether a weapon is offensive or defensive depends on the situation in which it is used".⁴⁷ Given the fluidity in international security, developing and designing a well-planned and coordinated defense doctrine based on national interest is essential. The definition of offense and defense should be developed with political priorities and economic interests. Undoubtedly, there is always a possibility that Bangladesh could tilt the strategic balance of power in the Bay of Bengal with far-reaching impacts on the Indo-Pacific. One should remember that Bangladesh, as of now, is one of the most significant UN Peacekeeping contributors, the 41st largest economy in the world, and the most strategically stable country without border or strategic tensions or conflicts with its immediate neighbors. It sits between South and Southeast Asia and is at the heart of the Bay of Bengal. The country's growing economic power, potential to assume regional leadership, and ensure stable control over sea lanes can convert Bangladesh into a strategic fulcrum in the era of U.S.-Chinese great-power competition. Henceforth, to prevent the spillover effects of great power rivalries, destabilizing conflict spiral, and since "offensiveness and defensiveness of many weapons are ambiguous," the preparedness should be bolstered with choices open to AirSea Battle (ASB) and Anti-Access or Area Denial (A2/AD).⁴⁸ A doctrine, therefore, would give the international community a better sense of security and how Bangladesh's armed forces would act in a hostile situation.

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⁴⁶ Dmitry Gorenburg, "Russia's New and Unrealistic Naval Doctrine".

⁴⁷ Michael Brown, "Preface", In *Offense, Defense, and War*, edited by Michael E. Brown, Jr. Owen R. Cote, Sean M. Lynn-Jones and Steven E. Miller, xvii. Cambridge: MIT Press, 2004.

⁴⁸ Zachary Keck, "AirSea Battle, A2/AD and the Offense-Defense Balance", *The Diplomat*. 06 August 2013, Available at: <https://thediplomat.com/2013/08/airsea-battle-a2ad-and-the-offense-defence-balance>.

PRESENT STATUS AND FUTURE SCOPE OF IMPROVING CRUDE SALT PRODUCTION IN BANGLADESH

Mohammad Gulzarul Aziz, Mohammad Rabiul Islam,
Sarif Istiak Akash, M Burhan Uddin

Abstract

Salt production industry plays an important role in the national economy as it supplies one of the most essential ingredients (salt) for our daily diet. Based on a claim of poor quality of our crude salt, salt industries import a significant amount of crude salt from abroad. This issue distracts farmers from getting fair prices and creates a threat in existing of our crude salt industry. This study aims to assess the present status of the crude salt production systems, particularly the critical factors responsible for inferior crude salt quality with possible ways of their improvement and the feasibility of salt cultivation using seawater and sub-surface water in the coastal regions of Bangladesh. A one-time point cross-sectional survey design was adopted for the household survey utilizing both quantitative and qualitative approaches using semi-structured questionnaires, Focus Group Discussion and Key Informant Interviews (KII). A random sampling of crude salt and brines from different location were used for the quality assessment study. Crude salt cultivation practices observed among farmers are unscientific and far away from the principles of gradual natural evaporation and fractional separation of the soluble compounds in the sea brine. Salt samples collected from farmers' salt fields from different salt centers were found to have contained low sodium chloride and high moisture and impurities. Underground brine is often found of almost similar quality to the surface brine but found rich with 'Fe' content and its removal technique eventually increased the cost of production. A wide variation was observed in the cost of salt at its crude state; refined state and edible state during the value chain study. In conclusion, implementation of the recommendations appended in the conclusion and recommendation section by the stakeholders in general and by the government, in particular, may eventually pull up the farmers from extreme poverty and education level and inject the newer technology for high-quality crude salt production in the country.

Keywords: Crude Salt, Salt Cultivation, Mohajon, Khash Land, Canal, Salinity, High Tide, Ebb Tide, Brine Pit, Sediment

Introduction

Salt production is an ancient industry. It plays an important role in our national economy. This industry is the supplier of an essential ingredient (salt), which has diversified use in our daily diet. It has also a great contribution to industrial development and employment generation. The growth of fish farming, livestock farming and the readymade food/food sector has increased than expected. With these increases in population, livestock, fisheries and food industries, the demand for salt is also rising, which is closely associated with the growth of this sector. The growth of the salt industry is also related to the attainment of self-sufficiency in salt to save a huge amount of foreign currency that would be required for importing salt. This industry is the largest labor-oriented cottage industry in Bangladesh and generates a large number of employments. Total workers engaged in the business were 50854 generating an annual income of 20.00 million BDT. Hence, the proper nursing of crude salt production and the producers is very important for the overall development of this sector and for the overall economic growth of the country as well.¹

The conditions in which salt farmers operate are difficult. They frequently deal with all the risks associated with the sea because they are so close to the ocean. Because there is no storage facility, there are instances when the whole output is washed away by strong rain and coastal surge. They don't receive the proper price, as well. Sometimes intermediaries and traders feign a financial crisis in order to cease buying. To meet their daily needs, however, the farmers must sell the salts even at a lesser price. In addition to this, money is the primary issue facing salt producers.

This industry was developed by people who traditionally specialized in it and was known as Mulunghee. They used to produce salt by evaporating water by boiling the saltwater. Salt Industries are producing salt from saline water of the sea in the coastal areas of Bangladesh, especially in Cox's Bazar and Chittagong districts.² According to the Salt Census (2018),³ about 907 ghona over about 60 thousand acres of land at 8 Upazillas of the 2 districts are under salt cultivation

¹ MA Al Mamun, M Raquib, TC Tania and SM Rahman, "Salt industry of Bangladesh: A study in the Cox's Bazar", *Banglavisian*, vol 14, no. 1, 2014, p.7-17.

² D. M Myers and C. W. Bonython, "The theory of recovering salt from sea-water by solar evaporation", *Journal of Applied Chemistry*, vol 8, no. 4, 1958, p. 207-219.

³ A. Hossain, "Salt Farmer's Census, PRISM Programme – Technical Assistance to BSCIC Component", A project funded by the European Union, 2018.

where 27526 salt farmers are engaged. The total salt production in 2017-18 was 15 lac M. ton, of which 50% were produced in Moheshkhali and Chokoria Upazila. Despite increasing the demand for salt now a day, the capacity of crude salt production has not been increased due to numerous challenges faced by farmers, farming itself and others.

The difficulties salt farmers face in producing and marketing crude salt include high land rent, limited access to banks and high rates of interest at other sources, high production costs, input supply that is expensively controlled by intermediaries, and selling crude salt to those intermediaries so that they can set the price. Natural limitations, such as a short evaporation season, unexpected storms and rain, a lack of mechanization, and dwindling farmland due to other activities, are some difficulties that agriculture itself encounters. Other difficulties include the tariff structure on Glauber Salt and other salts, as well as the import of sodium chloride under the name of sodium sulfate.⁴ Hence, initiatives are necessary to find out the root causes behind the problems and ways to overcome these challenges.

Based on the above background this study is concerned with the assessment of the present status of the crude salt production systems particularly loss of salt during post-harvest production and processing with possible ways of their improvement and feasibility of salt cultivation using seawater and underground water. This study also identifies problems in the value chain management system of salt production and suggests necessary recommendations to reduce the problems.

Methodology

The study utilized a one-time cross-sectional survey design to assess the present status and further scope of improving crude salt production. Information/data was collected by sample survey with a questionnaire as well as instrumental analyses of crude salt samples and brine water either directly in the field or in the laboratory. For the sample survey, both quantitative and qualitative approaches, as well as instrumental analysis of crude salt and brine, was used. Some distinctive qualitative research methods like FGD and KII were used for the quality assessment of the crude salt.

⁴ M. S. Hossain, M. Z. Hossain and S. R. Chowdhury, "An Analysis of Economic and Environmental Issues Associated with Sea Salt Production in Bangladesh and Thailand Coast", *International Journal of Ecology and Environmental Sciences*, vol 32, 2006, p. 159-172.

Purposive random sampling was followed for selecting the respondents for the quantitative data collection at the village level. Two villages from each union were selected randomly. Total respondents 336 were allocated equally among the six unions with a sample of 56 from each union. A sample of 28 respondents in the intervention area from each village was randomly selected and interviewed using a pre-tested questionnaire. A total of 340 microenterprises were visited to collect the quantitative data from all 6 intervention unions. In each union, an FGD was carried out through discussion guidelines and checklists.

Study Area. Crude salt quality improvement estimates were obtained from twelve (12) salt-producing areas located in 2 districts. Among the centers, Sorol, Purba and Borguna were in Bash Khali Upazilla in Chattagram district and Chowfoldondi, Dulafulchari and Islampur in Cox's Bazar Sadar Upazilla, Lemsikhali in Kutubdia Upazila, Uttor Nolbila, Moterbari and Gurokghata in Moheshkhali Upazila, Dorbeskata in Chakuria Upazila and Leda in Teknaf Upazila.

Sample Size. There are twelve salt development centers under the BSCIC (Bangladesh Small and Cottage Industries Corporation) salt development office, Cox's Bazar. According to the salt census, the total number of farmers involved under the twelve salts development center is 27528. A sample size of 380 has been calculated and sample farmers were selected from three different salt farmer groups based on their land size.

Sampling Design. The overview of the sampling design of the crude salt quality assessment and improvement possibility is shown in Figure 1.

Sampling of Crude Salt. Consultants visited salt fields and collected crude salts from the field during salt production. Primarily, crude salts were sampled randomly from three salt heaps and then mixed and packed in a polythene bag and marked the crude salt sample with the name of the respective salt center. Accordingly, ten salt samples were collected from ten centers and shifted to the laboratory immediately for analysis.

Sampling of Brine. Brines from the salt fields and sub-surface brines were collected for assessing the effect of brine quality on the yield and quality of the crude salt. Water from the Shallow Tube well (STW) and Deep Tube well (DTW) was collected in a similar way for assessing the brine quality and its effect on the yield and quality of the crude salt. About 250 mL of brine samples of water collected from every center were collected and analyzed.

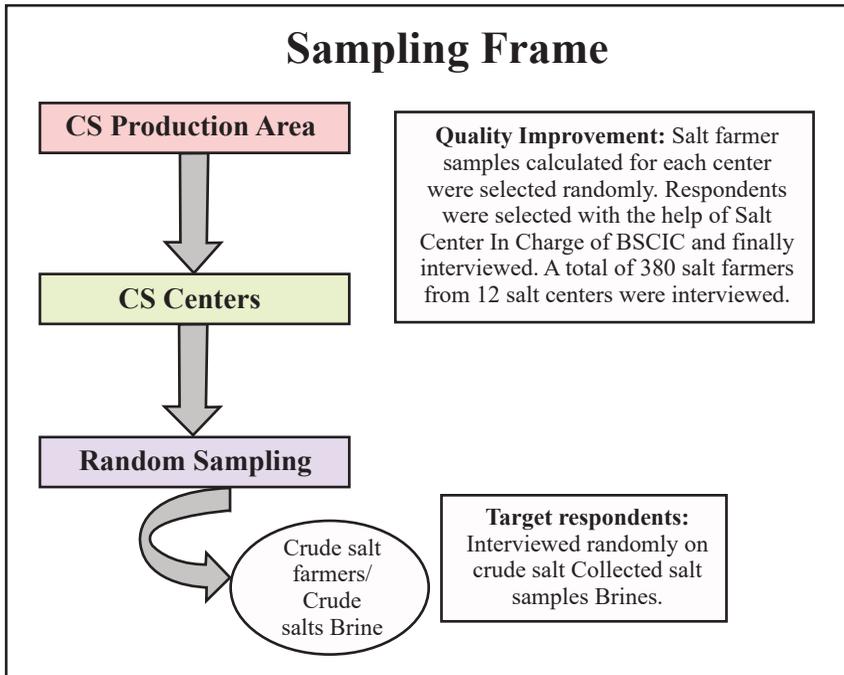


Figure 1: Sampling Frame Used for the Study

FGD. FGD was carried out in every salt development center to identify the reasons for low-quality crude salts. Six to eight farmers were invited and interviewed with a pre-tested checklist. In total, ten (10) FGDs were carried out in ten salt centers.

KII. Key informants interviewed for the crude salt quality improvement study included DGM Salt Centers, Assistant Monitoring Officers/Supervisors, Coordinators NI/UNICEF/GFA, Salt processing Supervisors/Chemists (Selected Salt Mills) and high officials of BSCIC, Dhaka to obtain their opinions about the causes that resulted in low-quality crude salts.

Data Generation and Analysis. Data generation phase for salt quality assessment and improvement of crude salt consists of the development of a questionnaire, check-lists preparation, selection and training of enumerators, field data collection, crude sample collection, laboratory analysis protocol and data management and analysis. Data analyses were carried out by data management software Excel and statistical software SPSS.

Results and Discussion

Farmers Characteristics

Farmer’s Age. The distribution of salt farmers under different age groups is presented in Table 1. It is observed that the highest proportion of salt farmers (30.46%) was from the age group of 31-40 years followed by 26% from 41-50, 19.5% from 51-60, 14.5% from 21-30 while only 2.1% of those were from the group of <20 years old.

Age Group	No. of farmers (N)	Overall (%)
<20	8	2.1
21-30	56	14.5
31-40	117	30.4
41-50	101	26.2
51-60	75	19.5
61-70	27	7.0
71-80	1	0.3
N	358	100

Table 1: Age Group of Farmers

Farmer’s Education. Among all, about 60% of farmers only could sign or be found illiterate. The remaining 40% of crude salt farmers were found educated as shown in Figure 2. However, 22% of the total respondents reported having attended the primary, 8% to the pre-secondary and 5% up to the secondary level. It is also observed from the chart that 3% of the crude salt farmers were found educated up to the graduate or above.

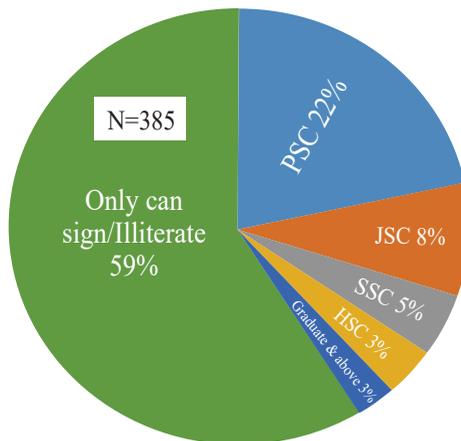


Figure 2: Proportion of Farmers (%) Who Attended School or Pre-School

Family Members. It is observed that there is no female member involved in crude salt farming. About 95% of respondents are directly involved in salt farming. Among them, about 65 % of respondents managed the CS production by engaging only their families. However, 30% of respondents found 2 or more members involved in crude salt cultivation. The remaining 5% are secondary farmers.

Cultivated Land and their Ownership

Generally, farmers possess four types of land for salt cultivation; namely salt production land, cultivable land, household land and water body. Among the total land, about 80% of the land was used for salt cultivation followed by 15.4% reported to use for crop production, 4% in the category of household and less than 1% of respondents reported to have been in the category of a water body.

Among 385 samples, about 90% of the farmers don't have their own land for salt cultivation. About 65% of them got a lease from landowners, followed by 25% who produced crude salts on the hired land, 11% on their owned land and only 1% of respondents produced salt in the Khasland. It indicates that the lease value of the land is a vital factor to make the salt cultivation business profitable.

However, 38% of farmers reported that they got the lease of their land directly from the land owner whereas more than 40% had it through brokers. With regard to the duration of the lease, salt farming is a seasonal activity and respondents take a lease for every season.

Inception and Method of Crude Salt Production

Background History: Crude salt production in this area was initiated by the British regime. About 14% of crude salt farmers reported to have involved in this profession right after independence (1975-1985), about 22% between 1985-1995, about 31% got involved in 1995-2005 and about 30% of the CS farmers reported to get involved in this profession within 2005-2020. Currently, entire salt cultivation is being carried out on the polythene bed. The use of polythene was initiated in 2000 since this method provides clear salt, high production, and lower labor cost and effort.⁵ However, the initial investment is relatively higher in this method.

⁵ Md Shahadat Hossain et al, "Land Use Zoning for Salt Production in Cox's Bazar Coast of Bangladesh: A Remote Sensing and GIS Analysis", *Asian J. Geoinform*, vol 3, 2003, p. 69-77.

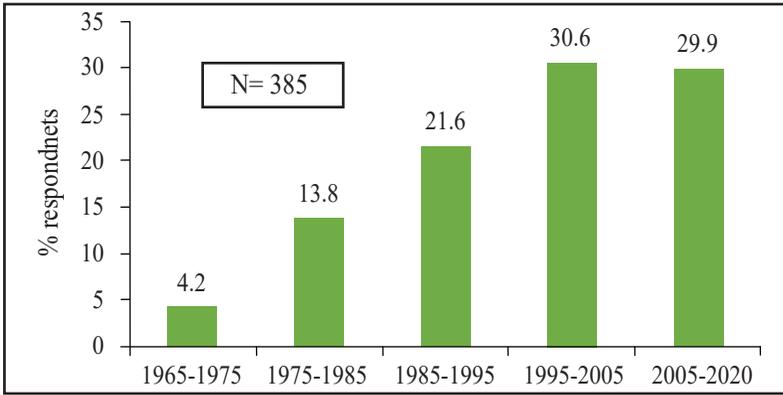


Figure 3: Involvement of Farmers in Crude Salt Production

Duration and Season of Crude Salt Production

Climate condition influences the production season of crude salt. It also varies with the location and market price. However, most of the crude salt farmers reported that generally mid of November to mid of May is the actual season of salt production.

Batch Number and Duration of a Batch of Crude Salt. The findings on the number of batches of crude salt produced and the time required to harvest one batch are presented in Figure 4. According to the chart, about half of the total respondents produced about 26 to 30 batches of crude salts followed by about one-third (32.7%) who reported producing 21 to 25 batches, 15% produced between 31-35 batches, about 3% of farmers produced less than 20 batches and rest 2.3% of the total respondents produced as high as 36 to 40 batches of crude salts. About 80% of the total respondents reported that it took an average of 5-6 days to harvest one batch of crude salt. The first batch took a long time which may be as long as 20 to 24 days and the following batches need less time duration.

Amount of Crude Salt Production. Figure 5 represents the distribution of the crude salt farmer with regard to the amount of salt production per batch per acre of land. Three fourth of the total farmers reported that they produced between 500 to 1000 Kg crude salt in a batch on one-acre land followed by about 24% whose production capacity was between 1000 to 1500 Kg and about 2% of the total farmers reported that their production was as low as 400 to 500 Kg per batch per acre land. About half of the respondents reported that the peak salt production month was March and the remaining half proposed it as April. The peak time of salt production also depends on the location and prevailing climatic conditions.

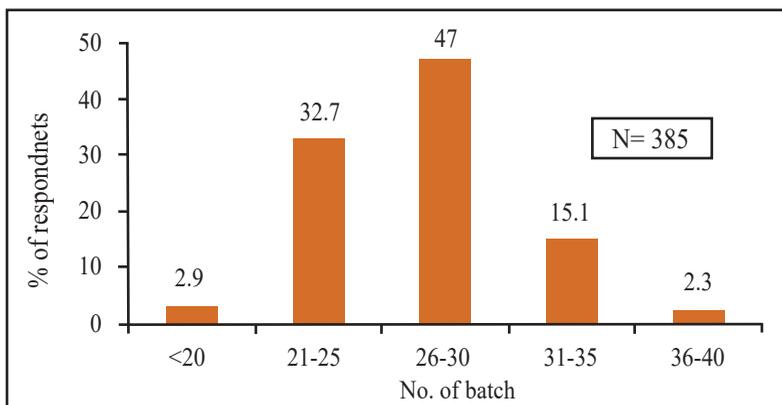


Figure 4: Distribution of Respondents (%) Based on the Number of Batches CS Produced

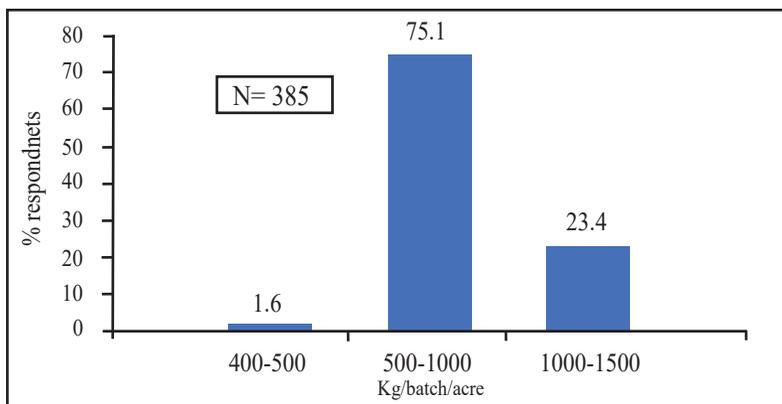


Figure 5: Distribution of Respondents (%) Based on the Amount of CS Production

Factors related to Crude Salt Price

All the farmers (100%) confess the variation in price in the market. The potential reason for such a variation was due to over/low production which was mainly because of the weather condition of that particular season. The demand for refined salt in the retail market also influences the demand for crude salt. This price variation is crucial for farmers. Furthermore, the import of crude salt in the name of sodium sulfate also affects the price of the local salts.

Farmers prefer selling their crude salt directly to the millers or BSCIC authority for a credible price. However, investors and land owners are the main market actors who control the market price of crude salt. About 61% of the total

crude salt farmers reported that they have an idea about the market linkages and about 63% of them mentioned the name of Mohajon as the main market linker. About 76% of the total CS farmers reported having contact agreements with different groups for the marketing of their salt. Nevertheless, contact salt farming and land lease contact were the two most important agreements maintained by crude salt farmers.

Market Price of the Crude Salt

The respondents were asked about the existing selling price of the crude salt and found that more than half of the total respondents (about 53%) reported having the price of 44 Kg crude salt was between Tk. 150-200, followed by about 42% who reported to have the price of 44 Kg crude salt was between Tk. 100-150 and only 5% said it between Tk. 200-250. A negligible proportion of salt farmers (<1%) mentioned the existing crude salt price was between Tk. 250-300 or Tk. 300-350.

Surface Brine Source and Strength

In most salt-producing areas, brine is drawn from canals that are located far away from the sea. The strength of the canal water is influenced by the seasons and tides. At the beginning of the salt season; specifically in December, the salinity of the canal water is found to be low (2.2) and the value gets higher when the production season approaches the peak. The variation in salinity of the canal water at different times of the production season in Islampur is presented in the chart. However, drainage of fresh water through the canal also results in a lower degree of brine in the canal at the beginning of the season.

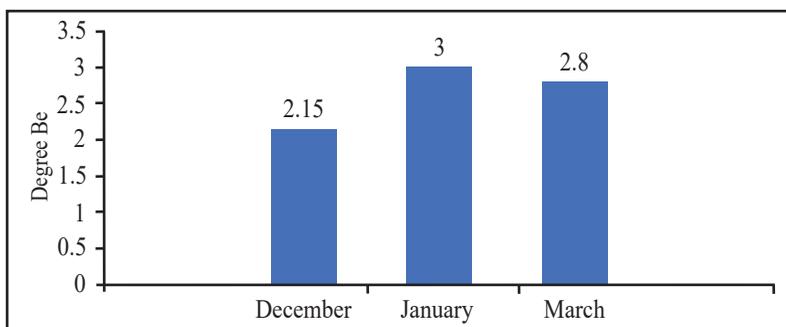


Figure 6: Brine Density Influenced by Season

The presence of salt in the seawater during high and low tide was observed to be different. The average degree of salinity of the canal water during high tide

and ebb tide over the three different months is presented in Table 2.

Condition	Degree Be During		
	December	January	March
Flooding	2.1	3	3
Ebb	1.0	3	2.5

Table 2: Brine Density Jointly as Influenced by Season and Tidal Time

Brines in terms of better quantity and quality were obtained during high tide. As shown in bar Figure 7, degree Be is higher during high tide than that of in the ebb. As mentioned in the earlier section, the season is an important factor in the case of getting high-strength brines.

A variation in the brine density in degree Baume used for the CS cultivation in different salt-producing centers was also observed and presented in the Figure 7.

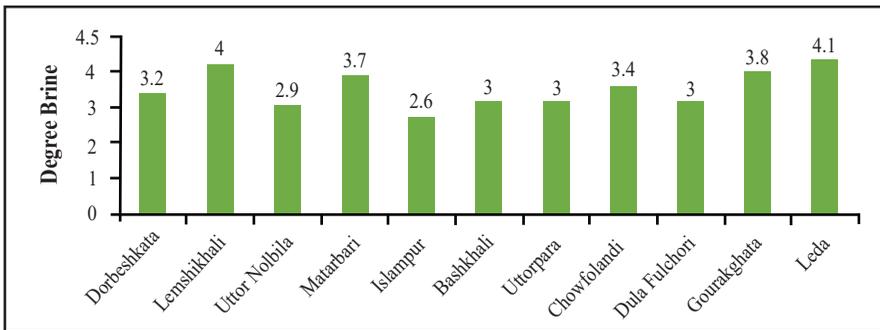


Figure 7: Different Salt Center's Brine Density

Salt Cultivation Methods

Farmer's practices of crude salt production were found similar in all the crude salt-producing centers. BSCIC has demonstration fields with improved practices according to the recommendation made by a consultant who worked for UNICEF. One NGO, PADEKHEP, has also demonstration fields with slightly modified practices. A distinct difference was observed between the salt production practices of farmers and the demonstration of BSCIC and NGO in Chawfalandi Salt Center. Major differences were observed in the number of salt field beds, reservoir size, the ratio of the condensing and crystallizing area, water flow path, the presence of a brine pit and the use of polythene in the crystallization chamber. The effect of these factors on the production of quality crude salts is described with scientific reasons under the following sub-headings.

Salt Bed Number and Size. Farmers normally divide a salt-producing unit into 4 to 5 small compartments. Each compartment has a unique local name. The compartment is charged with brines at a shallow height (1-4 inches) and allowed to flow the brines to the next. Finally, the salt is collected on polythene in the crystallization chamber. In the BSCIC demonstration field, the number and size of the compartments are many compared to the farmer practices. NGO's demonstration plots are almost similar to that of farmer's practice except having no polythene in the crystallization chamber. The salt bed arrangement in the farmers' practice and improved practices are shown in Table 3.

Practices	Reservoir Numbers (avg)	Reservoir sizes (avg)	Brine height in the reservoir (inch)	Degree attained in the last reservoir
Farmers Practice	3-4	Small	Shallow	4
BSCIC	7-8	Large	Deep to shallow	7
NGO	3-4	Medium	Shallow	4

Table 3: Different Salt Bed Arrangement Practices Observed in the Field

It is evident from the above table that with the increase in reservoir numbers brines got enough time to attain the desire degree. The large size of the reservoir and deep brine height resulted in high-degree brines due to wind ripples that increase the evaporation surface as shown in the table. The higher number of reservoirs also increased the crystallization-to-condensation ratio.

Ratio of the Crystallizing to Condensing Area. The average ratio of the crystallizing to the condensing area in the farmers' fields was found 1/3 to 1/4 which was nearly 1/10 in the BSCIC field. In the case of NGO field practice, the ratio was close to that of farmers' practice as shown in the Figure 8. The standard ratio of the crystallizing to condensing area for a brine having an initial density of 2 to 3 Be is about 1/10. This is totally absent in the farmer's field. This ratio allows better gradual evaporation and fractional separation of the soluble compounds in the sea brine and thereby attained the desired density for crude salt production.

Brine Flow Path. Farmers shifted brine from one compartment to another using channel in a straight direction whereas BSCIC demonstrated in a zigzag pattern. This pattern is more scientific for attaining concentrated brines due to longer exposure to solar radiation since it allows brines to travel longer distances in a given area.⁶

⁶ Venkatesh Mannar, "Guidelines for the establishment of solar salt facilities from sea water, underground brines and salted lakes" UNIDO, UNO, 1982.

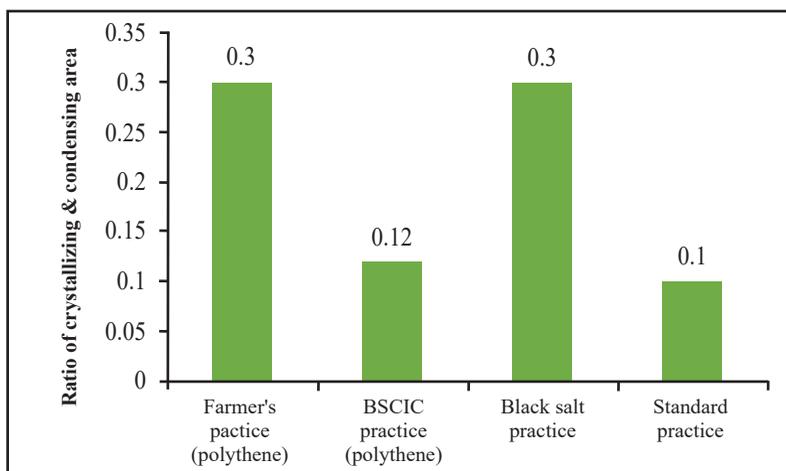


Figure 8: Crystallizing to Condensing Ratio Found in the Field

Sprinkling of Brine from Brine Pit. The presence of a brine pit in the semi-crystallization chamber was observed in the farmers' salt field. The density of the brine in the pit varies from 9-10Be. This weak brine is sprinkled over the saturated salt on the polythene. In the BSCIC salt bed, no such brine pit was observed. Scientifically, this practice resulted in immature and highly impure and hygroscopic salt. Seawater is a mixture of different salts and they got separated at the different densities of the brine. When this weak brine is sprayed over the saturated brine on polythene, sodium chloride gets crystallized along with other salts like calcium, sulfite and magnesium etc. These chemicals have different solubility in water and get separated when brines are gradually evaporated.

Physical separation of different compounds present in seawater with the progress of evaporation is given in Table 4. The changes in the brine density in different compartments of the farmers, BSCIC and NGO practices are shown in Table 5.

Serial No	Compounds separated during evaporation	Ranges of density (Be)
1	Clay and other organic matters	Upto 3.5
2	Iron (in the form of hydroxide)	3.5-10
3	Carbonates of calcium	10-17
4	Sulphate of calcium	17-23
5	Sodium or Potassium chloride	23-29

Table 4: Physical Separation of Seawater Compounds During Concentration⁷

⁷ D. M Myers and C. W. Bonython, "The theory of recovering salt from sea-water by solar evaporation", Journal of Applied Chemistry vol 8, no. 4, 1958, p. 207-219.

Practices	Location	Density of brine (Be) at			
		Reservoirs	Condenser	Semi-crystalizer	Crystallizer
Farmers Practice	Chawfalandi Salt Center	2-4	3-6	9	26-29
BSCIC	Chawfalandi Salt Center	2-8	9-10	16-17	26-29
NGO	Chawfalandi Salt Center	2-4	4-10	9-10	26-29

Table 5: Brine Density in Different Compartments of the Salt Work)

When Table 4 and Table 5 are compared, it is observed that the spraying of weak brine by the farmers over the crystallization bed, resulting the drying of the salt with all present soluble chemicals coming from the pit brine. This practice increased the total salt yield but reduced the sodium chloride content in the salt. Finally, the salt with other chemical compounds like calcium and magnesium salt make the product hygroscopic which allows containing high moisture and eventually productivity goes down.

Use of Polythene. Field data indicated that most of the crude salt farmers (99.7%) reported having used polythene in the crystallization pan. This helps to produce clear salt but charging of weak brine results in impure and hygroscopic crude salt.

Compaction of the Salt Bed. Desire compaction of the salt bed was found another factor that affects the quality of the produced salt. The local name of the compaction apparatus is called Khora. Its average weight ranges from 20-25kg which is not sufficient to get the desired compaction of the salt bed.

Composition of the Cultivated Salt

The crude salts collected from different salt centers are analyzed for moisture, Sodium, Calcium, Magnesium, sulfates, suspended solids and insoluble solids. The findings of the analyses are presented in Table 6.

Table 6 shows that sodium chloride content in most of the crude salts collected from different salt centers ranged from 80% to 90%. Apparently, the higher the sodium chloride content in salt the lower the moisture and other impurities content. Crude salts of Gourapghata and Teknaf (Leda) centers area contained the highest amount of sodium chloride with the least amount of moisture and other impurities. On the other hand, Gomaloti's crude salt contained the highest amount of moisture and other impurities. Significant amounts of unidentified compounds were also found in the crude salts of different centers. Crude salts from Dorbeshkata and Gomatoli showed the highest content of magnesium and calcium and hence the least quality crude salt. There is no standard for crude salt in Bangladesh. But it is authorized that, Indian crude salt has better

quality than that of Bangladesh. So, the collected crude salt's quality can be compared with Indian crude salt.⁸

Name of the Centre	Name of Guna	Attributes assessed (% wet basis)					
		NaCl	Moisture	Insoluble matter	Ca ⁺⁺	Mg ⁺⁺	Undetermined
Uttar Nolbila	Tettaghona	86.29	8.83	1.84	0.74	1.72	2.14
Gourakghata	Boro, Hattalia	89.15	5.71	1.10	0.54	0.45	3.75
Matar Bari	Sonakhali	83.70	11.36	1.76	0.2	1.65	2.35
Dula - Fulchori	ShilkhaliGona	85.16	10.04	1.04	0.87	1.05	3.16
Saral Salt Centre	SoniarBaperGona	80.35	12.65	1.20	0.86	1.54	4.95
Lemsikhali (kutubia)	GoineaGona	83.54	10.52	1.22	0.2	1.69	3.97
Dorbeshkata	Septakhali, Mognamma	82.23	14.01	1.12	0.44	2.71	1.44
Teknaf (Leda)	Mong Bazar	87.12	9.01	1.50	0.27	0.89	1.93
Choufoladondi	Khamarpara, MohorirChora	81.32	13.74	1.68	0.2	1.53	2.58
Gomatoli (Islampur)	Boroghona	81.32	14.91	1.15	1.79	2.96	1.02
Indian Salt		92.03	4.50	0.74	0.11	0.07	2.38

Table 6: Crystallizing to Condensing Ratio Found in the Field

Underground Brines and Salts

Underground brine and salt were collected from two villages in the Chawfolondi area. Brines density and the quality of the salts produced from the brines are assessed in Figure 9.

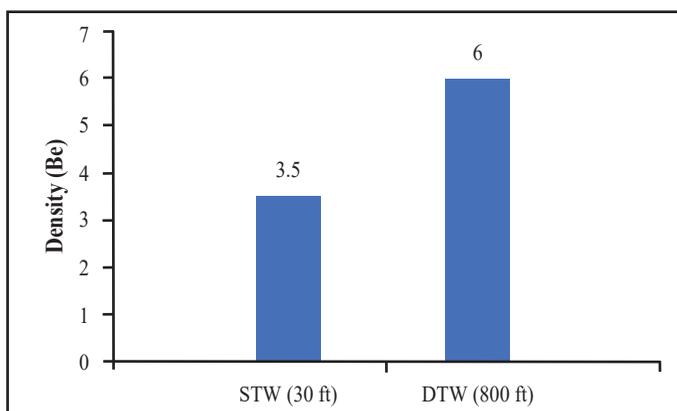


Figure 9: Brine's Degree of Sub-Surface Brines

⁸ Mohammad Anas Ansari, "A report on Bangladesh Salt Industry: Current practice of production, preservation & further improvements", A project funded by UNICEF, 2018.

Brines Quality. The density (Be) of the underground brines collected from two different types of sources is presented in Figure 9. The sub-surface brine density at STW (Shallow Tube well) was found low compared to the DTW (Deep Tube Well) brines. The freshly extracted brine was slightly turbid and within 24 hours of storage, red-colored materials settled at the bottom of the container and the water became transparent. This sediment is likely to be the oxide or hydroxide of iron.

Quality of Underground Brine's Salt

The crude salts from sub-surface brines collected from two different sources are analyzed for moisture, Sodium, Calcium, Magnesium, Sulfates and insoluble solids. The sub-surface brine was colorless at the time of discharge and its color turned red after a few hours of storage due to oxidation in presence of air. It indicated a high iron concentration in the brine. However, the brine became colorless after 24-48 hours of storage and formed reddish sediment at the bottom of the container. When colored and clear brines were evaporated in the lab, the salts obtained were different (salts in the left and right Petri dishes). Salt in the middle Petri dish was the salt collected from farmer's fields prepared from sub-surface brine.

The salt collected from two sources was analyzed and the findings of the analyses are presented in Table 7. A slight variation was observed between the salts concerning chemical compounds. Moisture content was reasonably high and sodium chloride content was only about 80%. However, the overall quality of the sub-surface salt is found close to the salt quality produced by farmers in many salt centers from surface brines. Furthermore, using sub-surface brine needs abundant area for the stock pile of brine and relatively modern technology that will increase the cost of CS production further.

Compositions	Underground Brines' Salt	
	STW (50 ft)	DTW (800ft)
NaCl	80.30	80.18
Moisture	11.14	10.5
K+	0.33	0.41
Ca++	0.84	0.88
Mg++	2.1	2.2
Sulfate	1.37	1.4
Insolble matter	4.33	4.50

Table 7: Quality of Crude Salts from Underground Brines Collected from Chawfolondi

KII & FGD Findings

KIIs were carried out among high officials of BSCIC, salt mills owners, NGOs and development partners working in this field. Key informants involved in salt refining termed the local salts inferior to Indian salt in terms of NaCl and impurities contents. The major issue in connection to crude salt production as claimed by the farmers is the low selling price. They also made opinions related to CS farming, storage, quality improvement, maturity gain, impurities, cost of production, sale and so on. FGD findings were found inline with the household interview findings of the individual crude salt farmers. Key issues obtained from the KII and FGD have been included in the recommendation section.

Value Chain Study

Five primary activities are observed in the value chain analysis. They are inbound logistics, operations, outbound logistics, marketing and sales services. Support activities were illustrated in a vertical column over all of the primary activities. These are procurement, human resources, technology development, and firm infrastructure. The following diagram shows salt price variation from production to retailer end and a wide variation in prices of salt was noticed. At the farmer's end, it shows loss whereas processors made profit up to 55% and at dealer and retailer end, these profits were around 7% and 14% respectively. Overall, the salt prices became double at the retailer's end. In the Diagram 1, a wider variation in prices of salt produced in traditional salt mills from producers to retailers as well. At the farmer's end, it shows loss whereas processors made profit up to 60% and at dealer and retailer end these profits were around 15% of each. Overall, the salt prices became double at the retailer's end.

Production Cost of Farmers. For producing salt from seawater, a farmer needs to expense money in the different stages including land lease fees, labor costs, polythene costs, brokers, transport, etc. Overall, for farming per kg crude salt, a farmer needs to expense 5.50 tk. This is shown in the flow chart of diagram 1 & diagram 2.

Processing Cost of Salt. In processing plants for crushing, washing and drying crude salt expense is different in a different types of mills like traditional, mechanical and vacuum mills. Overall, the cost of salt rises to 10 tk per kg from the field to processing in the mechanical mills. The detailed cost can be observed in the flow chart of diagram 1 & diagram 2.

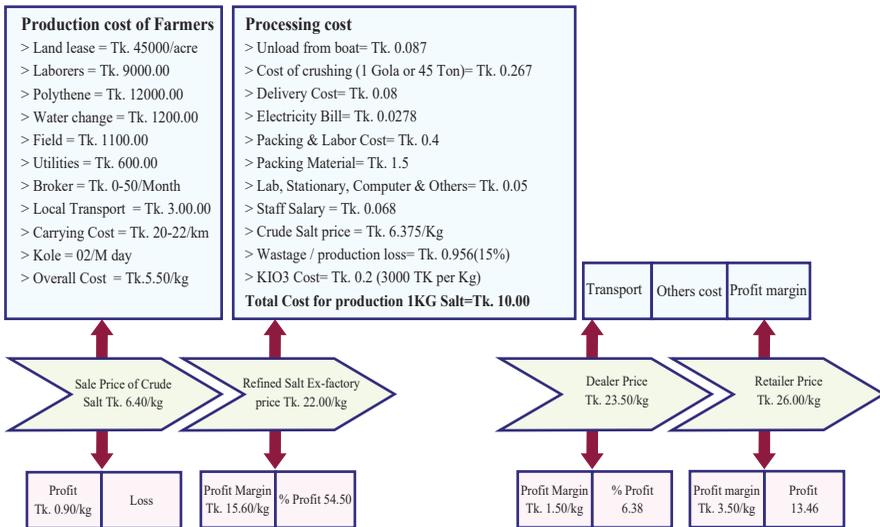


Diagram 1: Value Chains for Mechanical Salt Factory

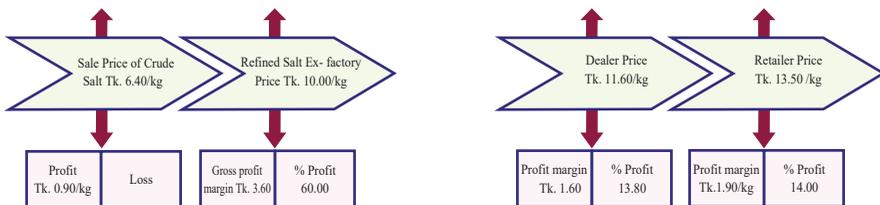


Diagram 2: Value Chains for Traditional Salt Factory

Conclusion and Recommendations

Salt production is an ancient industry and plays an important role in our national economy. This industry is the supplier of an essential ingredient (salt), which has diversified use in our daily diet. The process of obtaining salt (sodium chloride) and other substances which are dissolved in seawater is entirely one of the gradual evaporation and fractional separation of solids at different degrees of concentration. However, the scientific principles in the current practices of crude salt production by farmers in the polyethylene method are not followed which resulted in salts with high impurities and hygroscopic properties. On the other hand, recently, it has been witnessed that demand for salt has increased but the production of crude salt farmers has not increased. Crude salt cultivation practices observed among farmers are unscientific and far away from the principles of

gradual natural evaporation and fractional separation of the soluble compounds in the sea brine. Salt samples collected from farmers' salt fields from different salt centers were found to have contained low sodium chloride and high moisture and impurities. Underground brine is often found almost similar in quality to surface brine. Moreover, sub-surface brine was found rich with 'Fe' content that needs to be removed by using 'turbid' tools. Furthermore, stockpiling of sub-surface water will eventually increase the cost of production. Besides, extracting groundwater is not a good idea in terms of geological perspectives. Therefore, the production of CS from sub-surface water in this region will not be feasible technology. However, implementation of the following recommendations of this study by the stakeholders in general and by the government, in particular, may eventually pull up the farmers from extreme poverty and education level and inject the newer technology for high-quality crude salt production in the country.

Production Issues

- Provision of Bank loans for CS farmers at low interest will benefit the farmers and increase production;
- The major impediments to CS production are the price of inputs, laborers' cost; land lease cost, rainfall and middlemen harassment;
- CS production is still dependent on farmer's traditional technology;
- Development of protocol is necessary to reduce the ratio between Ca and Mg (safe- Ca:Mg = 1 : 2, existing ratio 1 : 3). Besides, sulfate contents in CS are increasing day by day;
- The prospect of the use of groundwater may be evaluated for the production of CS;
- The rainfall, storms, sunshine, etc are important factors for CS production;
- Intensive training on the production and marketing promotion of CS is required;
- Most of the CS farmers inherited salt cultivation from their parents;
- New CS farming land should be identified to increase production; and
- Sand, mud, etc. reduced and white colour CS was obtained due to the use of polythene in the salt bed.

Quality Issues

- Improved technology for quality CS production using a uniform process is desirable;
- The demand for local CS is decreasing due to quality reasons. So, strengthening quality control/quality assurance is required;
- The polythene used in CS production should be of foodgrade;
- Due to the use of polythene in salt bed, accumulation of Mg and Sulphate in CS increased;
- The wastage during the refining of local crude salt is 16 – 20%, which seems to be very high; insoluble solids in brine water should be minimized; and
- The CS maturing time in the field should be optimized through studies.

Price Issues

- High lease money of land directly affects the price of CS;
- A minimum price for the CS may be fixed considering the production cost of the farmers;
- Brokers sometimes make very high-profit margins (Tk 70/bag of 86 Kg) which seem to be un-ethical;
- The high transportation cost of CS should be minimized;
- The production cost of CS varies from Tk 5.00 to Tk 7.00/kg;
- GoB may buy CS at a fixed price to serve the interest of the farmers; and
- The price of polythene may be reduced through subsidies for its production. Also, the quality of polythene should be improved to facilitate and ensure reuse it.

Cross-border Issues

- Salt millers claimed that refining loss was more (sometimes 20%) when they used local CS in their mills;
- A survey may be conducted to assess the total annual quantity of salt used for the industrial purpose;

- Import of sodium sulfate should be assessed by evaluating the need;
- It is reported that NaCl is being imported in the name of Sodium Sulphate (Na_2SO_4), packed and sold that should be checked and legal action may be taken to stop it;
- The farmers may be motivated to repay the loan because the loan repayment culture of the farmers is very much disappointing;
- Unemployment will be a serious problem in salt farming areas if CS cultivation is closed;
- A value chain study (crude salt to refined salt) may be conducted to assess the profit margins by different stakeholders and optimize the profit of each actor through corrective actions.

Policy Issues

- Proper implementation of salt law is not in place;
- A buffer stock of two lac ton of CS may be made to address the emergency crisis;
- Import of crude salt and refined salt should be discouraged;
- Sodium Sulphate may be imported in liquid form (if it serves the purpose) to control the import of NaCl in its name;
- A standard for different grades of CS should be formulated and approved by BSTI;
- Systematic research to increase yield and improve quality of CS is required; The land lease should be controlled by the Government to benefit the CS farmers;
- BSTI (Bangladesh Standards and Testing Institution) should establish a new section to analyze the salt/crude salt and formulate the standards;
- Salt Farmers Cooperative may be formed to serve their common interest; and
- A Salt Development Board may be constituted for maintenance of smooth running of CS production by the farmers, refining and iodizing of salt, by salt millers.

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