Journal of Bangladesh Institute of Planners ISSN 2075-9363
Vol. 13, 2020 (Printed in June 2021), pp. 29-45, © Bangladesh Institute of Planners

IFAS and EFAS Analysis of Maritime Region, Bangladesh: Entwining Strategical Approach

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Abstract

Maritime region was a pertaining issue for its existing source of energy and resources and it was envisaged as an economic hub for a developing country like Bangladesh. Be a distinction nation, there was a notion to attain sufficiency and environmental sustainability by the proper utilization of maritime resources, but it was far behind for several reasons specially lack strategy and planning. IFAS and EFAS analysis manifested an object's current situation and made it possible to aggravate future action plans. The objective of the study was to analyze 32 indicators of maritime region through internal factor analysis system (IFAS) and external factor analysis system (EFAS) where the indicators of strength and weakness were conceived in IFAS and opportunity and threat were enumerated in EFAS. The primary data were collected through questionnaire survey and deep interview and secondary data were excerpted from different published reports, research paper and article etc. and organized by IFAS and EFAS matrix. Based on the score of IFAS and EFAS the results showed that the position of maritime region was in quadrant 3 (internal weakness, IFAS ≤ 2 and external threat, EFAS ≤ 2) and highest score was 3.733 (IFAS). Considering quadrant 3, the aftermath suggested some strategical approaches for achieving sustainable development and underpinning economic growth in Bangladesh.

Keyword: Maritime region, IFAS, EFAS, matrix, quadrant, Strategy.

Introduction

Bangladesh is a maritime nation having about 1,10,000 km^2 exclusive economic zone (EEZ), about 712 km coastline and about 700 rivers (Mujibur, 2017). The maritime region covers about 32% of the total area (Ferdous & Rahman, 2020:109861) and serves 27 million people along its coastline (Ahsan & Khatun, 2020:101752) and about 38.52 million people in the 19 coastal districts (Sattar & Cheung, 2019:101283). After the international verdicts on the disputed maritime region, Bangladesh conquers from Myanmar and India about 118,813 km^2 maritime region with an extended continental shelf about 37,000 km^2 and depth up to 50 m (Hussain et al., 2018:88-99). The boundaries in these three countries consolidate to disclose one continuous maritime region and the ITLOS (International Tribunal for the Law of the Sea) is compelled to analyze a range of coastline and seabed geo-physical features to demarcate a maritime region in accordance with international law of the sea (Figure 1) (Qiu & Gullett, 2017:45-54). In the maritime region, Bangladesh bestows an affluent reserve of both alive and inanimate resources (Shamsuddoha et al.,

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2017). Maritime region reputes the preservation, property and utilization of coastal resource, ocean, seas, and marine resources for escalating economic benefits. It is specially incited the small island developing state and least developed country like Bangladesh for sustainable demeanor of maritime resources (Ninawe & Oceanography, 2017:1-3; Sarker & Rahman, 2015:25).

Maritime region-based trades bestead and contribute to the world's economy more than 500 billion USD (Ocean, 2017) and maritime region delivers about 82 million tons of world fisheries production (FAO, 2020). Maritime region imparts about 16 % of country's total fish production in Bangladesh (Bangladesh Fisheries Report, 2018). In the maritime region, the salt production per acre is 17.25 metric ton in traditional method and 21 metric ton in the modern method (Banglapedia, 2020). About 230 billion USD to the world economy for marine fisheries in the maritime region clinch directly or indirectly the livelihood of 8% of the world's population (Sarker et al., 2018:180-192). About 20,00,000 metric ton of different sorts of outdated ships are recycled and about 1,833,461 metric ton of reusable materials are produced in Bangladesh 's ship recycling industry (Hossain & Applications, 2017:6). The maritime region also delivers expedient routes of transportation for about 80% of world trades i.e. merchandises and transported by maritime routes (Corbett, 2017:31). In Bangladesh, demand of new ship building is escalating at the rate of 3-4% and the sea borne cargo growth is rising at the rate of 6-8% per year (Saki et al., 2019:98-102). The port contributes through transporting container cargo about 5,000 trucks in Chittagong port (Monir, 2017; Saha, 2018). In the tourism sector, gross domestic product (GDP) and employment contribution to Bangladesh are 4.3% of GDP and 3.8% of total employment (Chakraborty et al., 2020:100279) where about 161 billion USD in revenues occur annually from the world marine and maritime tourism (FAO, 2020).

The Bangladesh maritime sea-boundary with India and Myanmar has given a new opportunity to attain sustainable economic development by exploiting the blue ocean to its south. Besides, Bangladesh and Nepal have reached agreement to promote land transportation system between the two countries (Wikipedia, 2020). The Bay of Bengal's (BoB) connection with the Indian Ocean has strengthened its connectivity with neighboring countries, which develop the national economy (Chaudhury & Chatterji, 2019). India and other states have been exploring the exporting cargoes such as food grains, raw materials for clothing through sea routes to make bilateral trade more competitive (Choudhury, 2020). Besides, the Ganga-Brahmaputra delta is located in Asia where the Ganga and Brahmaputra rivers are discharged into the BoB (van Driel et al., 2015:-) and the Bengal fan is completely covered by the floor of BoB (Schwenk & Spieß, 2009:107-131).

On a recent global index, Bangladesh has ranked 47th which is positioned countries as penetrable, dominant and indebted to illegal, unregulated and unreported (IUU) fishing (The Daily Star, 2020). There has been incommensurate regulation to stop the unauthorized entry of the fishing ships, fisher-men and cargoes of the neighboring states and to superintend the environmental degradation of maritime region (Hosen, 2019:1331). Though Bangladesh has 27 gas fields (Moazzem, 2019), in FY 2014-2015 Bangladesh Petroleum Corporation (BPC) has imported 1.297 million tons of crude oil and 4.095 million tons of refined oil and only 3% electricity is produced from renewable

energy sources and it has been happening for lack of modern technology (Uddin et al., 2019:655-661). The International Maritime Organization (IMO) estimated that carbon emissions from shipping can increase by 50 to 250% between 2010 and 2050 (Alam & Xiangmin, 2019:17-27).

Armed robbery, theft and maritime piracy constitute the major threats to maritime security in the maritime region. Maritime area of the country is surrounded by 'Golden Crescent' from Pakistan which is shared the sea with 'Golden Triangle' of Myanmar (IPAG, 2019). The Suritec Piracy Report, 2014 has revealed that the impending seaborne threats will occur in South China, the Gulf of Guinea and Bangladesh. The transboundary has numerous ecological consequences due to water diversion and its importance between Bangladesh and India at the national and regional level (Baten & Titumir, 2016:13-27). Almost 53% of the coastal areas in maritime region are affected by salinity and due to increase in temperature 32^{o}C, the coastal aquaculture has been declined (Ahmad, 2019:1-7).

Internal factor analysis system (IFAS) and external factor analysis system (EFAS) are two strategies, and its results are mostly interpreted as the list of internal and external factors (Erya et al., 2018). IFAS is per lustrated as strength and weakness which is faced by the institution and EFAS is perceived as opportunity and threat which is utilized by the institution (Oetomo et al., 2012:171-186). IFAS and EFAS are large scale approach aimed at engaging with a competitive environment in order to achieve institution's intent (Tresna & Research, 2017:401-411). Strength, weakness, opportunity and threat (SWOT) analysis is a part of IFAS and EFAS technique that considers its internal capacity and external situation, widely used for identifying appropriate strategy (Oetomo et al., 2012:171-186).

Ike et al., 2019 have showed IFAS and EFAS investigating evaluation strategies for facing small and medium enterprises (SMEs) competition in Kotalama, Malang city. In their research the strategy standards are compiled on the basis of a combination of assessment strategies with the highest to lowest IFAS and EFAS weight (Ike K. R., 2020). Tresna & Research, 2017 has discussed the internal and external environmental analysis in Tasikmalaya city embroidery industry. In the research, the environmental internal and external factor matrix are analyzed using SWOT technique where the results of study have showed that Tasikmalaya city embroidery industry is in quadrant 2 that means the industry is in rising condition (Tresna & Research, 2017:401-411).

This paper has focused on the second portion of the research work where the first portion has been discussed elaborately about the SWOT analysis of maritime region in Bangladesh and the present paper avoids it and designs on the mathematical approach considering the indicators. The contribution of the present study is to gather a different and unique concept to analyze 32 indicators of maritime region through IFAS, EFAS analysis where there is limited such research work in Bangladesh. The ultimate target of the IFAS, EFAS analysis is to find out a quadrant that delivers an existent scenario of maritime region. Besides there is a scope to discuss about the strategical approaches to develop the maritime region based on the aftermath of IFAS, EFAS quadrant. In this paper, section two has been discussed about study area and the materials and methods

have been described briefly in section three. In section four, the findings, discussion and strategical approaches have been discussed. Finally, the concluding remark has been discussed at the end of the paper.

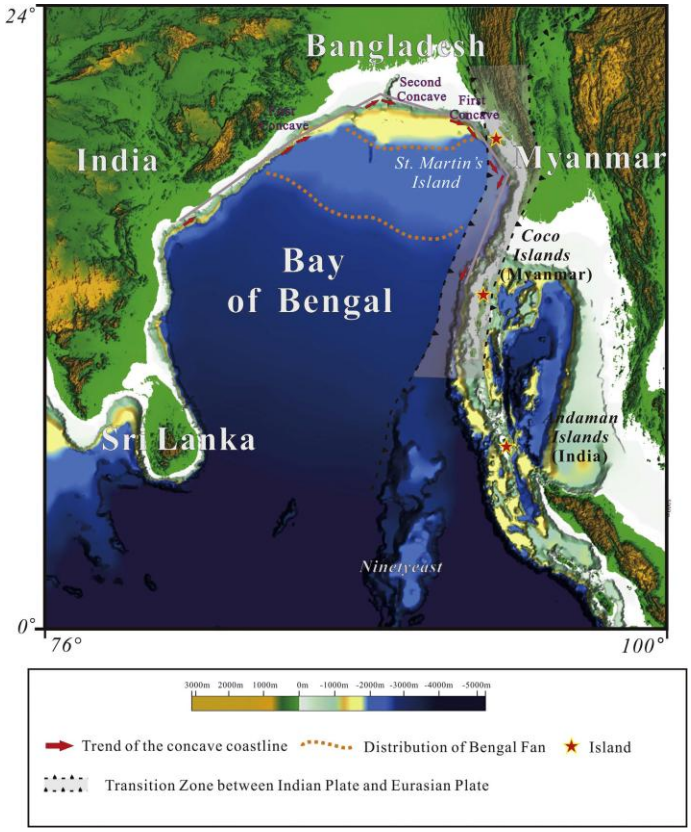

Figure 1: Sketch map concerning geographic features in the Bay of Bengal (Qiu & Gullett, 2017:45-54)

Study area profile

The study area was consisted of 19 coastal districts called Barguna, Bagerhat, Bhola, Barisal, Chittagong, Chandpur, Feni, Cox's Bazar, Jessore, Gopalganj, Khulna, Jhalkati, Narail, Lakshmipur, Patuakhali, Noakhali, Satkhira, Pirojpur and Shariatpur. which covered 47,150 km^2 and off-shore islands (BoB) of Bangladesh and it was low lying and very flat having height 3 m above mean sea level of the maritime region (Sattar & Cheung, 2019:101283). Geographically the location lies between latitude 18^o – 23^o N and longitude 89^o – 93^o E. In the maritime area the hydrological regions were South central, North central, South East, South West, river and estuary and Eastern Hill and the basin areas were the Ganges, the Meghna & the Brahmaputra Basin (BDP-2100, 2018). The study area was located at the Northeastern part of the Indian ocean where India was at the West and Northwest, Myanmar and Andaman and Nicobar Islands of India were at East position (Figure 2).

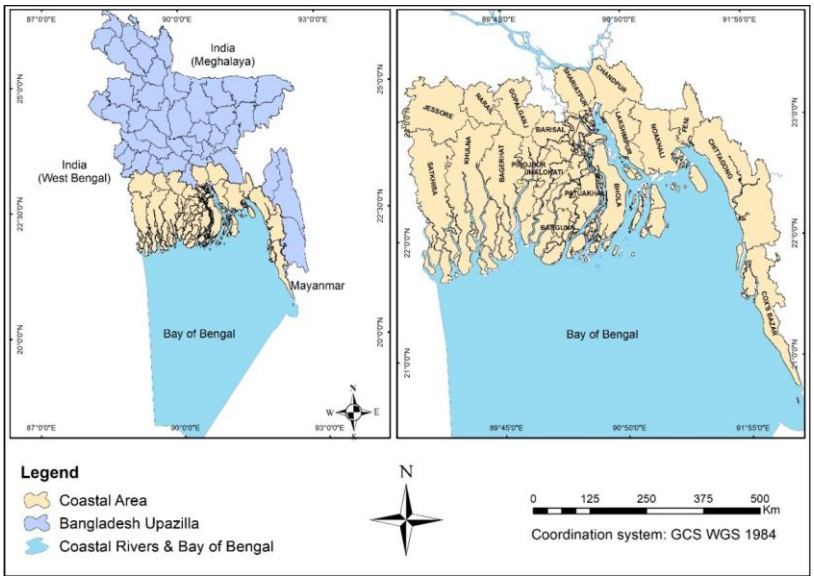

Figure 2: Study area map (Authors generated)

Materials and Methods

IFAS and EFAS parameter identification

The IFAS and EFAS indicators (total 32 indicators) were identified through literature review and deep interview with the faculties of different universities of Bangladesh focusing on the department of Marine Technology, Maritime Science, Fisheries and Oceanography. From the primary and secondary sources IFAS was considered as the strength and weakness of any specific region. In maritime region the strength was consisted by the abundance of fisheries, natural gas, sea salt production, ship and boat building, tourism sector, port and maritime logistic, marine renewable energy, marine manufacturing and ship recycling of Bangladesh. IUU fishing, oil and gas extraction deficiency, coastal water pollution, lack of regulation, lack of monitoring in port, illegal trade in containers, lack of technology for marine renewable energy and lack of ecosystem protection were apprehended as weakness of maritime region. On the other hand, EFAS envisaged the opportunity and threat where the opportunity was consisted by international maritime boundary, interaction with international organization, relation with neighboring countries, connected with Indian ocean, connected with foreign sea port, tidal halophytic mangrove forest, Ganga Brahmaputra delta and submarine fan etc. Some indicators were taken into account as threat like robbery theft and piracy, arms and drugs smuggling, human trafficking, sabotage and terrorism, geopolitical issue, climate change, transboundary problem and marine habitats degradation etc.

Data collection technique

The study was carried out through primary data collection and secondary literature review. Some deep interviews were conducted through online discussion using virtual platform (Zoom and google meet) for selecting the indicators which were considered as strength, weakness, opportunity or threat for Bangladesh maritime region. After that, the

parameters of IFAS and EFAS were garnished in the questionnaire. Primary data were collected through online questionnaire survey (google docs) where the questions were developed by Likert scale 1 to 5 (strongly disagree, disagree, moderate, agree and strongly agree) (Oetomo et al., 2012:171-186). The whole questionnaire survey was handled in the period of June to August, 2020 and there was existing covid-19 pandemic. The population size was 543 (the maritime professionals, faculties, and stakeholders) and considering 90% confidence interval the sample size was 61.

Data Analysis technique

The IFAS and EFAS analysis were constituted by 5 steps. Step 1: the collected data from the respondents were treated as the value of IFAS and EFAS indicators. Step 2: the IFAS and EFAS values were converted into numerical value (Oetomo et al., 2012:171-186). Step 3: the numerical value was converted to conversion score considering highest, lowest and class interval. Step 4: it was given weight factor to its individual indicators based on discussion of research team where the overall weight factor of IFAS and EFAS were 1 or 100%. Step 5: based on the IFAS and EFAS score it was developed a quadrant matrix. At the end, the IFAS and EFAS were rated with the score greater than 2 (strength>2 & opportunity>2) and equal to or smaller than 2 (weakness $\leq$2 & threat $\leq$2) (Oetomo et al., 2012:171-186) (Rangkuti, 2006). The aftermath of quadrant matrix revealed some strategical approaches for the development of maritime region. Figure 3 demonstrated the overall conceptual framework of the research work.

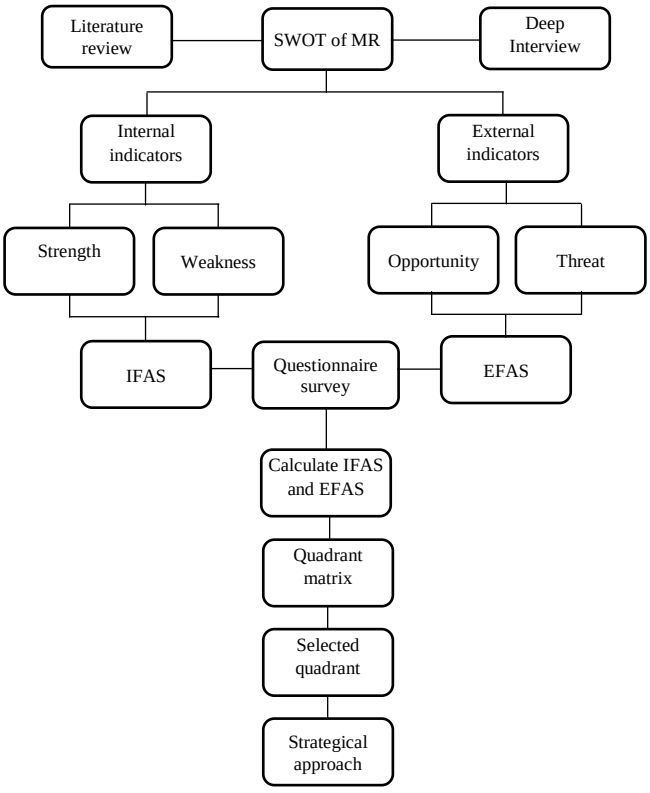

Figure 3: Conceptual framework of the study

Results and discussion

EFAS and IFAS analysis

The IFAS apprehended 16 indicators comprising 8 strength and 8 weakness indicators. Contrariwise, the EFAS was consisted of 16 indicators including 8 opportunity and 8 threat indicators. Table 1 illustrated the class interval and conversion scores and the sum of 61 respondents scores and conversion scores for IFAS and EFAS were shown in Table 2 and Table 3. According to theory, the respondents scores were converted to the numerical score from 1 to 4. The minimum value of the indicator was 61 that denoted all the respondents' answers were 'strongly disagree' (1) and the maximum value was 305 that prevailed all the respondents' replies were 'strongly agree' (5). Equation 1 showed the class interval of IFAS and EFAS matrix.

$$\text{Class interval} = \frac{maximum - minimum}{class} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

$$\text{Class interval} = \frac{305 - 61}{4}$$

$$= 61$$

Table 1: Conversion interval

Class Interval	Conversion Score
61 - 122	1
123 – 184	2
185 - 246	3
247 - 305	4

(Source: Field work, June-August, 2020)

Table 2: IFAS score and conversion score

Identity Strength	Factor	Score	Conversion Score
S1	Abundance of fisheries	273	4
S2	Natural gas	242	3
S3	Sea salt production	266	4
S4	Ship and boat building	257	4
S5	Tourism sector	258	4
S6	Port and maritime logistic	255	4
S7	Marine renewable energy	244	3
S8	Marine manufacturing and ship recycling	254	4
Weakness			
W1	Illegal, unreported and unregulated (IUU) fishing	228	3
W2	Oil and gas extraction deficiency	225	3
W3	Coastal water Pollution	276	4

Identity Strength	Factor	Score	Conversion Score
W4	Lack of regulation	280	4
W5	Lack of monitoring in port	285	4
W6	Illegal trade in containers	262	4
W7	Lack of technology for marine renewable energy	290	4
W8	Lack of ecosystem protection	233	3

(Source: Field work, June-August, 2020)

Table 3: EFAS score and conversion score

Identity Opportunity	Factor	Score	Conversion Score
O1	International maritime boundary	236	3
O2	Interaction with international organization	237	3
O3	Relation with neighboring countries	263	4
O4	Connected with Indian ocean	282	4
O5	Connected with foreign sea port	276	4
O6	Tidal halophytic mangrove forest	285	4
O7	Ganga Brahmaputra delta	268	4
O8	Submarine fan	277	4
Threat			
T1	Robbery, theft and piracy	233	3
T2	Arms and drugs smuggling	282	4
T3	Human trafficking	287	4
T4	Sabotage and terrorism	225	3
T5	Geopolitical issue	231	3
T6	Climate change	216	3
T7	Transboundary problem and issue	245	3
T8	Marine habitats degradation	252	4

(Source: Field work, June-August, 2020)

The factors of IFAS and EFAS indicators were weighted through discussions with the research team. After that, the IFAS and EFAS scores were calculated based on the conversion value and weight factors which were demonstrated in Table 4 and Table 5. The calculated IFAS score was 3.733 where the strength score (1.993) was higher than weakness scores (1.740) (Table 4) and the total EFAS score was calculated as 3.667 where the opportunity score was 1.977 and threat scores was 1.690 (Table 5).

Table 4: IFAS score calculation

Identity Strength (Ranking)	Factor	Weight	Conversion Score	IFAS Score
S1	Abundance of fisheries	0.084	4	0.336
S2	Sea salt production	0.080	4	0.320
S3	Tourism sector	0.070	4	0.280
S4	Ship and boat building	0.067	4	0.268
S5	Port and maritime logistic	0.064	4	0.256
S6	Marine manufacturing and ship recycling	0.057	4	0.228
S7	Marine renewable energy	0.055	3	0.165
S8	Natural gas	0.053	3	0.159
	Sub Total			1.993
Weakness (Ranking)				
W1	Lack of technology for marine renewable energy	0.080	4	0.320
W2	Lack of monitoring in port	0.070	4	0.280
W3	Lack of regulation	0.065	4	0.260
W4	Coastal water Pollution	0.060	4	0.240
W5	Illegal trade in containers	0.055	4	0.220
W6	Lack of ecosystem protection	0.050	3	0.150
W7	Illegal, unreported and unregulated (IUU) fishing	0.048	3	0.144
W8	Oil and gas extraction deficiency	0.042	3	0.126
	Sub Total			1.740
	Total	1		3.733

(Source: Field work, June-August, 2020)

Table 5: EFAS score calculation

Identity Opportunity (Ranking)	Factor	Weight	Conversion Score	EFAS Score
O1	Tidal halophytic mangrove forest	0.083	4	0.332
O2	Connected with Indian ocean	0.075	4	0.300
O3	Submarine fan	0.071	4	0.285
O4	Connected with foreign sea port	0.067	4	0.267
O5	Ganga Brahmaputra delta	0.061	4	0.245
O6	Relation with neighboring countries	0.059	4	0.236

Identity Opportunity (Ranking)	Factor	Weight	Conversion Score	EFAS Score
O7	Interaction with international organization	0.054	3	0.162
O8	International maritime boundary	0.050	3	0.150
	Sub Total			1.977
Threat (Ranking)				
T1	Human trafficking	0.100	4	0.400
T2	Arms and drugs smuggling	0.082	4	0.328
T3	Marine habitats degradation	0.068	4	0.272
T4	Transboundary problem and issue	0.062	3	0.186
T5	Robbery, theft and piracy	0.054	3	0.162
T6	Geopolitical issue	0.050	3	0.150
T7	Sabotage and terrorism	0.036	3	0.108
T8	Climate change	0.028	3	0.084
	Sub Total			1.690
	Total	1		3.667

(Source: Field work, June-August, 2020)

The calculated results of IFAS and EFAS scores noticed that the internal indicators had more effects on maritime region compared to external indicators as IFAS was greater than IFAS. The aftermath showed that individually IFAS and EFAS were greater than 2 i.e., 3.733 and 3.667 respectively but the strength and opportunity were not greater than 2 while the maritime region had been considering in the quadrant of internal weakness (IFAS ≤ 2) and the external threat (EFAS ≤ 2) (Table 6). Figure 4 revealed that maritime region was lied in quadrant three (weakness and threat).

Table 6: IFAS and EFAS matrix for maritime region

IFAS	**Strength (IFAS score>2)**	**Weakness (IFAS score ≤ 2)**
	1. Abundance of fisheries. 2. Natural gas. 3. Sea salt production. 4. Ship and boat building. 5. Tourism sector. 6. Port and maritime logistic. 7. Marine renewable energy. 8. Marine manufacturing and ship recycling.	1. IUU fishing. 2. Oil and gas extraction deficiency. 3. Coastal water pollution. 4. Lack of regulation. 5. Lack of monitoring in port. 6. Illegal trade in containers. 7. Lack of technology for marine renewable energy. 8. Lack of ecosystem protection.
EFAS		

Opportunity (EFAS score>2) 1. International maritime boundary. 2. Interaction with international organization 3. Relation with neighboring countries. 4. Connected with Indian ocean. 5. Connected with foreign sea port. 6. Tidal halophytic mangrove forest. 7. Ganga Brahmaputra delta. 8. Submarine fan.	1. Utilizing natural resources to take the opportunities from foreign countries. 2. Introducing ship manufacturing and recycling through international collaboration. 3. Increasing GDP by maritime commerce and trade focusing on forest and water management.	1. Strengthening international collaboration to conserve water and forest resources. 2. Improving modern technology, laws and regulations to extract natural resources.
Threat (EFAS score ≤ 2) 1. Robbery, theft and piracy. 2. Arms and drugs smuggling. 3. Human trafficking. 4. Sabotage and terrorism. 5. Geopolitical issue. 6. Climate change. 7. Transboundary problem and issue. 8. Marine habitats degradation.	1. Protecting and maintaining natural resources from various offense. 2. Increasing ship manufacturing and recycling through preventing international conflict. 3. Improving maritime commerce and trade to eliminate natural calamity.	1. Imposing laws and regulations to control the offenses. 2. Reducing water pollution and protecting ecosystem to control climate change and marine habitat degradation. 3. Utilizing natural resources through modern technology to ensure international mutual understanding.

Source: Field work, June-August, 2020

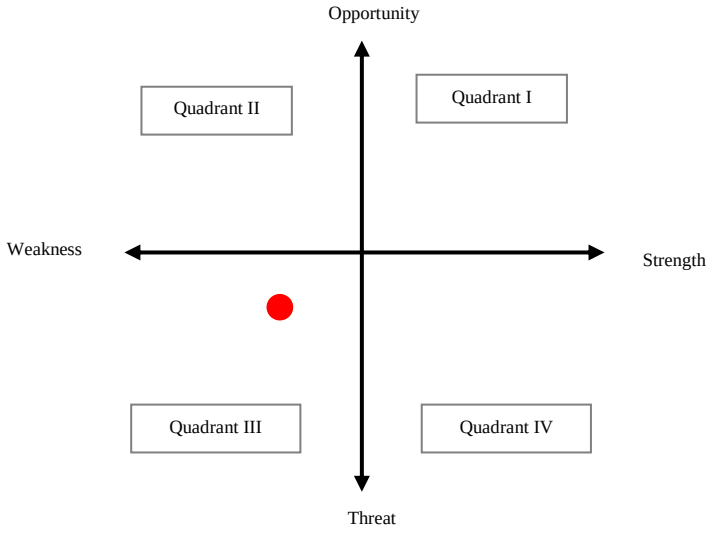

Figure 4: SWOT quadrant for maritime region (Authors generated)

Strategical approaches to develop the maritime region

Here is given some strategical approaches to develop the maritime region.

Policy formulation: It should have initial policy framework which fixup some goals and guideline for the development of maritime region. The policy will be accomplished by the executive and legislative action.

Strategic planning: It is called "Preliminary planning" where feasibility and potential impacts of the maritime region policy action are examined. This planning stage discusses about the resources and resource consumer, income, foreign exchange, jobs, social and cultural well-being. This planning stage evaluates the benefits, accumulates the wide area of data, creates general strategy, prepares recommendation for implementing policy.

Program development: The program for the development of maritime region is developed in details and there is a master plan for the maritime region development. Besides, an institutional mechanism is created and program responsibilities are embarked to the program members.

Climate change adaptation: Every year, many people are affected by the climate change and disaster and due to the adverse impact of climate change, additional investment is required to emulate the risk. It is required to prepare the database on the previous climate change disaster, and it should have assessed the risk for the future. It can be undertaken the vulnerable marine area for effective and adaptive conservation management. Some action plans can be taken like institutional and human capacity building, eco-system-based resource management, reducing anthropogenic stress, controlling coastal pollution and over fishing etc.

Preserve and manage fisheries: It requires empirical survey to assess the stock of all major species of commercial importance to determine the sustainable economic yield. It should impose appropriate legal framework to restrain over exploitation of the fishes. It requires appropriate infrastructure facilities such as cold storage, insulated and refrigerated systems etc. to preserve the over cultivated fisheries. It should prepare a central institute to preserve the database and information about the species in the maritime region.

Legal framework and monitoring system: To prevent the over-exploitation of marine fisheries it requires to impose appropriate legal framework and introducing catch monitoring system at the landing centers to assess the status.

Resource conservation and management: It requires mixed approach to enforce fishing rules, regulation, and social safeguard for effective implantation of legal framework that will curb IUU fishing. The small-scale fisheries should be taken under monitoring, control, and surveillance (i.e. mesh size is 14 to 18 cm).

Establishment marine protected area: To protect the maritime region it requires at least 10% of coastal and marine areas. It should have a long-term plan, institutional capacity and social policies to protect the area.

Conservation of mangrove forest: To conserve the world largest mangrove forest it requires to impose long term strategical plan for the climate change in the ecology and pollution in the adjacent waterbodies along with natural habitats. It should have strict enforcement of the environmental Impact Assessment (EIA) rule for the development in the forest area.

Constructing cyclone center and emergency management structure: As the natural calamities are peeped from different times in a year and it is uncertain to happen, it should have facilities of cyclone center and emergency management structure. To build the cyclone center and infrastructure it can be considered the high land and threshold population accessible.

Spreading broadcasting radio: The present community radio serves only 12 upazilas and there are 147 upazilas located in the maritime region. To broadcast the warnings to the inhabitants it requires considerable number of community radio stations for the remaining 135 upazilas (Ahsan & Khatun, 2020:101752).

Construction of coastal embankments: Bangladesh is situated in the riparian and different types of floods affect it in different times specially the coastal people face it time to time. It requires embankment in the coastal rivers and its adjacent low-lying lands to protect the households, infrastructure and agricultural land.

Creating setback zone: For developing the land and building any infrastructure in the maritime region it requires land use policy and building code. There should be rules and regulations to establish any infrastructure in the coastal area that is already enlisted as vulnerable area.

Building coastal greenbelt: To protect the natural calamities and climate change it is imperative to develop greenbelt along the coastline. Besides, the vacant lands can be taken for plantation.

Embellishing marine tourism: It requires eco-friendly tourism policy where the accommodation of transport facilities, infrastructure facilities, personal security will be mentioned. Besides, it can be adopted pro-poor tourism facilities for the poverty eradication of the inhabitants in the maritime region.

Maintenance of polders: To reduce the salinity problem it requires the maintenance the polder in the maritime region. The inhabitants in the maritime region specially who are involved in agricultural activities should be trained up and encouraged for the cultivation of saline tolerant rice and other adaptive advanced agricultural crops to fight with the saline intrusion in the crop fields.

Combat with salinity intrusion: To control the salinity in the water as well as in the agricultural land there should have policy to consume water from the aquifer or water table. It requires research center in 19 coastal districts where the ground water table and water recharge level can be experimented to control the salinity intrusion.

Coastal land reclamation: To protect the ecosystem, and utilize the coastal land it requires land use planning policy and coastal land development policy. Coastal zone policy, 2005 can be strictly maintained for the coastal agriculture, shrimp culture and industries. The illegal grabbing can be controlled, and vacant land can be used for the resettlement of the landless people.

Conferring coastal climate change policy: To manage the maritime region and control the climate change the following policies which are already taken by government should be followed and implemented mandatory, i.e. National Adaptation Program of Action, 2005**;** Climate Change Trust Act, 2010**;** Coastal development strategy, 2006**;** Bangladesh Climate Change Strategy and Action Plan, 2009**;** Tsunami vulnerability map, 2005**;**

Intended National Determined Contribution, 2015**;** Climate Change and Gender Action Plan, 2013**;** Coastal zone policy, 2005**;** National Plan for Disaster Management, 2016-2020**;** National Water Management Pan, 2000**;** National Adaptation Plan (Iqbal, nd).

Emending venerable actions and policy: It requires to develop an updated comprehensive policy framework by reconsidering the constraints of the present laws and regulations i.e. The Marine fisheries ordinance 1983; Offshore islands development boards (1977-1982); The territorial waters and maritime zones acts 1974; Bangladesh national conservation strategy (1987); Coastal environment management plan for Bangladesh (1988); Special parliamentary committee on coastal area development (1988-1990); National capacity building approach the ICZM initiative (1997) (Ahmad, 2019:1-7).

Maritime and high seas governance: As high seas are administrated by UNCLOS, it requires steps to build up cooperation among the regional countries and international organizations. It can be ennobled institutional capacity and vindicated coordination to control illegal and illicit activities in the high seas. Regional cooperation should be established for strengthening and controlling IUU fishing. It can be considered the transboundary issues pollution, habitat degradation and migration by undertaking coordinated research work. Strict dimension and wariness should be taken to control the foreign vessels as dumping place of hazardous wastes. Legitimate and relevant policy should be ensured to control illegal transportation of migrants from Bangladesh and foreign countries (Islam et al., 2018:45-54).

Conclusion

This paper dealt with the IFAS and EFAS technique to perceive the existing scenario of maritime region in Bangladesh where 16 indicators were apprehended in the IFAS and 16 indicators were envisaged in the EFAS (total 32 indicators). The aftermath delegated that the score of IFAS and EFAS were 3.733 and 3.667 respectively where the maritime region was prosecuted for the strength, weakness, opportunity and threat was 1.993 (>2), 1.740 ($\leq$2), 1.977 (>2) and 1.690 ($\leq$2) respectively. The IFAS and EFAS matrix and swot quadrant inflicted the third quadrant which was figured out the weakness and threat. The IFAS and EFAS techniques allotted that the maritime region was entangled both in weakness and threat and the quadrant suggested that if the threat and weakness would be lessened through strategical approaches then the maritime region could be participated to the national economy as well as sustainable maritime development.

In the present study, the first limitation was, only 32 indicators were used for analyzing the maritime region but the indicators were selected through deep interview and present reports and statistics. Based on the present study there is a scope to analyze more indicators in future. The second limitation was, deep interview and questionnaire survey were conducted when covid-19 pandemic was going on and so it was impossible to conduct direct interaction with the participants. As the survey was conducted through online, the confidence interval was not possible to consider 95 to 99%. In the pandemic all the research works were carried on through online and at that time all over the world carried out their research work through virtually, so the present study survey considering 90% confidence interval did not get severe limitations and it was acceptable. The last limitation was, the weight factors of IFAS and EFAS indicators were given based on discussion with the research team and it was calculated through manually. The

weight factors were calculated following the statistical method and so it was accepted for the analysis.

Since maritime region of Bangladesh is augmented with different resources and it contributes to the national economy. But the lack of policy, implementing existing plan and policy, proper exploration, exploitation and transmission of the resources, the maritime region is not enumerated for the national economy. So, based on the findings of this research some strategical approaches can be forwarded for the development of the maritime region. Furthermore, the inclusion of the results in this study will be helpful for planners, engineers, geographers, oceanographers, economists, environmentalists, government officials and policymakers to constitute the plan, policy and decision on the future development of the maritime region in Bangladesh.

Acknowledgement

The authors would like to thank all the participants especially the maritime professionals, faculties and stakeholders who have participated in the questionnaire survey and deep interview. The authors also acknowledge to the authors whose papers deliver the idea to full fill the research.

Conflict of interest

There is no conflict of interest between the authors.

Funding source

There is no known funding source.

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