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Current Marine Fisheries Production Status and Opportunity in Bangladesh

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Abstract: ***Bangladesh has sovereign rights over almost 118,813 km^2 in the Bay of Bengal, which is 81% of its total area. The country has a vast marine area, but its marine fisheries production is only 15% of the national production. More than 60% of the world's fisheries production comes from the marine sector, but in Bangladesh, the scenario is the opposite, although the country is enough potential. This study is designed to find the year-wise marine fisheries production trend and decompose the production into two sub-sectors called artisanal and industrial. Year-wise fisheries production data, from 2002 to 2021, are collected from the "Year Book of Fisheries Statistics of Bangladesh" available on the website of the department of fisheries of the government of the People's Republic of Bangladesh. Marine fisheries production in Bangladesh is increasing gradually, but the percentage share in national production is decreasing gradually. Marine production was 22.0% of the total in 2002, but it dropped to 14.7% in 2021. In 20 years of marine production, from 2002 to 2021, the average contribution of artisanal fisheries was 88.1%, while the contribution of industrial fisheries was only 11.9%. The standard deviation of artisanal and industrial fisheries is 0.51 and 0.36, respectively, indicating artisanal has high variability than industrial, but the growth rate of industrial is more fluctuated than artisanal. To increase its marine fisheries, policymakers of Bangladesh should develop a separate marine policy and allocate more funds for research and technological support.***

Keywords: ***Marine Fisheries, Artisanal Fisheries, Industrial Fisheries, Fisheries Production in Bangladesh, Marine Fisheries Scope in Bangladesh, Marine Fisheries in Bangladesh.***

1. INTRODUCTION

Bangladesh is a south Asian small country with a 147,570 km^2 area, but it has sovereign rights over almost 118,813 km^2 in the Bay of Bengal and possesses vast marine water resources rich in biodiversity. The marine water area of Bangladesh is 81% of its total area. Although the country has 64 districts, it has 19 coastal districts accounting for 32% of the total area. The

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coast of Bangladesh is about 700 km long broadly divided into three regions: the deltaic eastern region (pacific type), the deltaic central region, and the stable deltaic western region (atlantic type). The coastal zone of Bangladesh is rich in natural resources offering many tangible and intangible benefits to the nation. The mangrove forest, fisheries, tourism, port facilities, and natural resources are the top economic benefits. In the world, one of the most productive regions is the marine and coastal belt of Bangladesh (Tanzim & Shawkat, 2013).

Fisheries resources are very important for the socioeconomic and food security in Bangladesh. At least 12% of Bangladeshi depend on aquaculture-related functions for their survival either directly or indirectly. The country has 355,331,80 households out of which fisheries households are 995,135 which is 2.8% of the total (Bangladesh Bureau of Statistics, 2019). The second most exported income-earning sector of Bangladesh is fisheries and aquaculture (Ghose, 2014). Bangladesh exports its fisheries resources to more than 55 countries (Shamsuzzaman, et al., 2017). Although Bangladesh is affluent in coastal resources, there are some coastal management problems in the country. For managing the coastal fisheries in Bangladesh, there is a scarcity of regulatory authority (Shamsuzzaman, Xiangmin, Ming, & Tania, 2017). The vision of the department of fisheries of the Government of the People's Republic of Bangladesh is to meet the animal protein demand, earn more foreign currency, and reduce poverty from the fishery.

The Bay of Bengal is the source of marine resources in Bangladesh. To improve marine fishing activities, deep sea-going fishing vessels, merchant ships, fish processing plants, and similar functions, the government of Bangladesh established the Marine Fisheries Academy in 1973 (Marine Fisheries Academy, 2022). Marine fisheries in Bangladesh are divided into two categories; one is artisanal fisheries and, another is industrial fisheries.

The artisanal fishery is a small-scale fishery with small capital and poor technology means fishing by using a small mechanical or non-mechanical boat in shallow water. However, there is no universal definition of the artisanal fishery. As the artisanal fisheries case is specific and depends on the specific goals, no single method is best to define or describe the artisanal fisheries (Yannick, Reg A., Julia L., & Elizabeth A., 2019). Artisanal fishing occurs in shallow water normally within 40-meter water depth using mechanical or non-mechanical small boats with poor technology and low capital (Department of Fisheries, 2021). The industrial fisheries in Bangladesh also called trawling a method that involves pulling fishing nets into waters. Industrial fisheries are the fisheries in the deep sea, beyond 40-meter water depth, using larger boats such as trawlers involving a high level of technology and investment (Department of Fisheries, 2021).

In FY 2020-21, the total fisheries production in Bangladesh was 4.6 million metric tons where the marine production was 0.7 million metric tons, and its inland and marine production was 85.3% and 14.7%, respectively, in the same year. Although the country has vast marine water and biodiversity in the Bay of Bangla, the country is not had enough success to extract its marine fisheries. Further, the country has no marine culture fisheries. All marine fisheries of Bangladesh come only from marine capture. Its marine fisheries yield is broadly classified into two sub-sectors such as artisanal and industrial. At present, there is a research gap between the

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sectoral decomposition of marine fisheries production in Bangladesh. Understanding this research gap, this study shows the year-wise marine fisheries production status in Bangladesh and decomposes the marine production into artisanal and industrial to depict the sub-sectoral growth performance. This research may help to reform the marine policy in Bangladesh to fulfill goal 14, life below water, of the Sustainable Development Goal (SDG).

2. MATERIALS AND METHODS

The department of fisheries of the government of the People's Republic of Bangladesh has uploaded the year-wise fisheries production data file entitled, "Year Book of Fisheries Statistics of Bangladesh". To conduct the study, the researcher visits the website of the department of fisheries of the government and collects the year-wise fisheries production data, artisanal, industrial, and total, from 2002 to 2021 from the "Year Book of Fisheries Statistics of Bangladesh". The marine fisheries production of the country was obtained by summing up the artisanal and industrial production. In the "Year Book of Fisheries Statistics of Bangladesh," all data are presented according to the fiscal year, but for the analysis purpose the data set has been converted into the calendar year, such as the production from July 2020 to June 2021 in the Year Book has been considered as the production of 2021. All basic calculations and graphs for this study are performed by the Microsoft Office Excel Spreadsheet Software. The descriptive statistics of the study have been found by using the R package called "pastecs" of the R Studio.

3. RESULTS AND DISCUSSION

To show the marine and total fisheries yield trend from 2002 to 2021, the study draws the line graph in figure 1. Both total and marine fisheries production in Bangladesh is increasing gradually, but the production gap between the total and marine is also increasing day by day. The inland fisheries, other than the marine fisheries, are growing faster than the marine fisheries production.

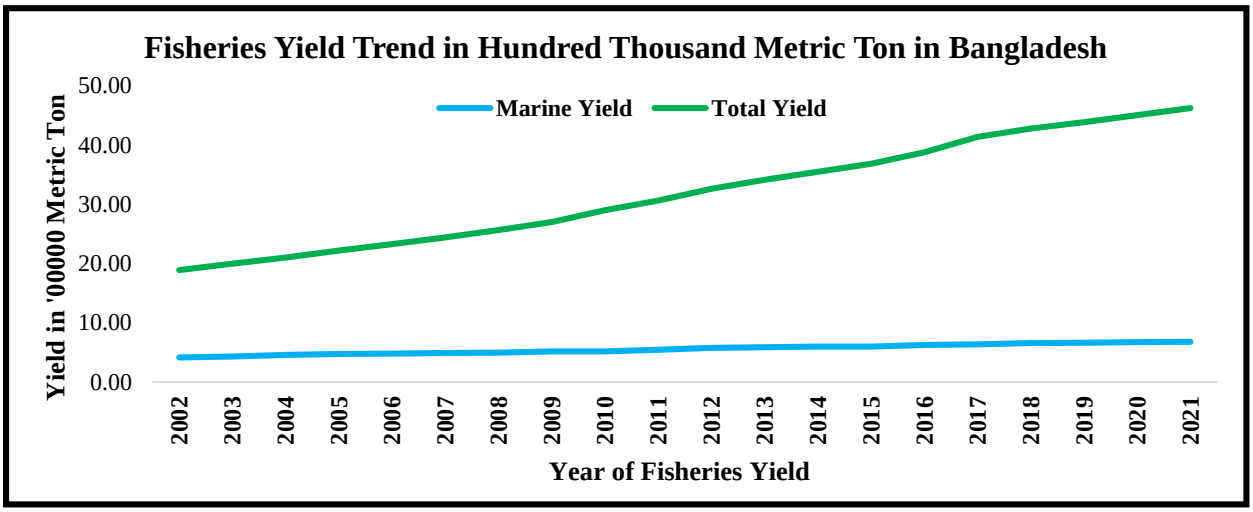

Figure 1: Fisheries Yield Trend in Bangladesh

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In this research, total production means the sum of inland and marine fisheries. For a better understanding of the fisheries production in Bangladesh, the study considers the further analysis in table 1. In 2002, marine production of the country was 4.15 hundred thousand metric tons which was 22.0% of the total, while the total production was 18.90 hundred thousand metric tons. After 20 years, in 2021, marine production of the country was 6.81 hundred thousand metric tons which was 14.7% of the total, while the total production was 46.21 hundred thousand metric tons. Marine fisheries production reduced its percentage share from 22.0 in 2002 to 14.7 in 2021. Although both the marine and total fisheries of the country are increasing gradually, the percentage share of marine production is decreasing gradually. Further, the growth rate of marine fisheries was 4.0% in 2003, but it turned to 1.5% in 2021 meaning the growth rate of marine fisheries is also decreasing in recent years. In 2018, 64.5% of the world's fisheries production came from the marine sector (The State of World Fisheries and Aquaculture, 2020). In 2018, only 15.3% of fisheries production came from the marine sector in Bangladesh. The country has the huge potentiality to increase its marine production, but it is failing to extract its marine resources. Further study is required regarding the reasons for failing marine resources extraction in Bangladesh.

Table 1: Marine and Total Fisheries Yield in Bangladesh in Hundred Thousand Metric Ton

Year	Marine Yield	Total Yield	Share % of Marine	Growth % of Marine
2002	4.15	18.90	22.0	-
2003	4.32	19.98	21.6	4.0
2004	4.55	21.02	21.7	5.4
2005	4.75	22.16	21.4	4.3
2006	4.80	23.29	20.6	1.1
2007	4.87	24.40	20.0	1.6
2008	4.98	25.63	19.4	2.1
2009	5.15	27.01	19.1	3.4
2010	5.17	28.99	17.8	0.5
2011	5.46	30.62	17.8	5.6
2012	5.79	32.62	17.7	5.9
2013	5.89	34.10	17.3	1.8
2014	5.95	35.48	16.8	1.1
2015	6.00	36.84	16.3	0.7
2016	6.27	38.78	16.2	4.4
2017	6.37	41.34	15.4	1.7
2018	6.55	42.77	15.3	2.7
2019	6.60	43.84	15.1	0.8
2020	6.71	45.03	14.9	1.7
2021	6.81	46.21	14.7	1.5

Marine production is the sum of artisanal fisheries and industrial fisheries. Table 1 depicts the year-wise marine production, percentage share in total, and growth rate. Now, figure 2 represents the year-wise distribution of artisanal, industrial, and total marine fisheries production status in Bangladesh.

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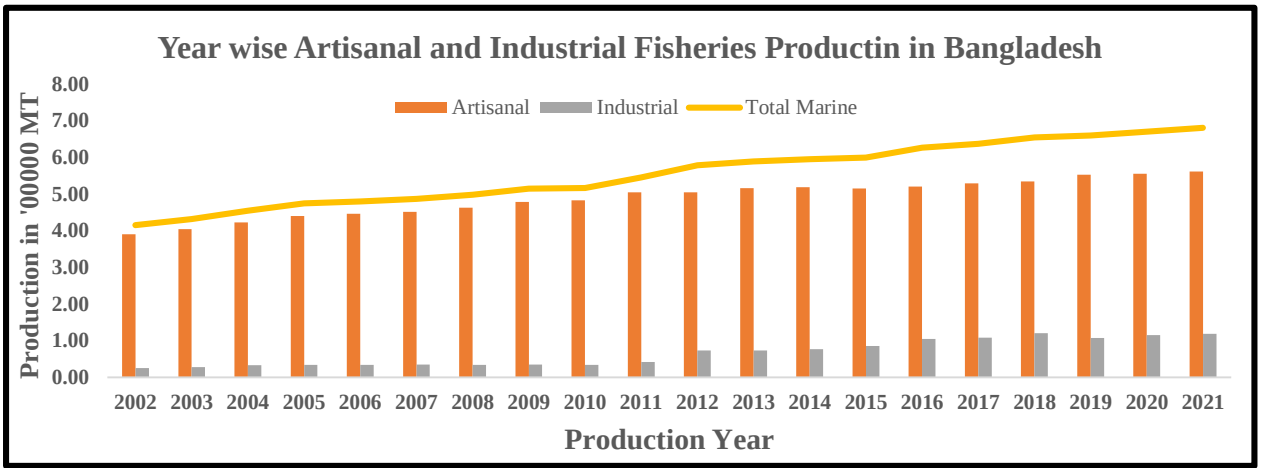

Figure 2: Distribution of artisanal, industrial, and marine fisheries yield in hundred thousand metric ton

According to figure 2, marine fisheries production in Bangladesh is passing into increasing trend since 2002. The artisanal fisheries sub-sector is the main power of marine fisheries in Bangladesh. The study considers the analysis in table 2 for a better understanding of the marine sector.

Table 2: Sub-sector-wise Marine Fisheries Yield in Hundred Thousand Metric Ton

Year	Artisanal Yield	Industrial Yield	Total Marine Yield	Artisanal Share % in Marine	Industrial Share % in Marine	Artisanal Growth %	Industrial Growth %
2002	3.90	0.25	4.15	93.9	6.1	-	-
2003	4.04	0.28	4.32	93.5	6.5	3.5	11.1
2004	4.23	0.33	4.55	92.8	7.2	4.6	16.6
2005	4.40	0.34	4.75	92.8	7.2	4.2	4.6
2006	4.46	0.34	4.80	92.9	7.1	1.2	-0.1
2007	4.52	0.35	4.87	92.7	7.3	1.4	3.8
2008	4.63	0.34	4.98	93.1	6.9	2.5	-3.5
2009	4.79	0.35	5.15	93.1	6.9	3.4	3.7
2010	4.83	0.34	5.17	93.4	6.6	0.8	-3.5
2011	5.05	0.42	5.46	92.4	7.6	4.5	21.9
2012	5.05	0.73	5.79	87.3	12.7	0.1	76.1
2013	5.16	0.73	5.89	87.6	12.4	2.1	-0.5
2014	5.19	0.77	5.95	87.1	12.9	0.5	5.3
2015	5.15	0.85	6.00	85.9	14.1	-0.7	10.4
2016	5.21	1.05	6.27	83.2	16.8	1.2	24.2
2017	5.29	1.08	6.37	83.0	17.0	1.5	3.0
2018	5.35	1.20	6.55	81.7	18.3	1.1	10.7
2019	5.53	1.07	6.60	83.7	16.3	3.4	-10.7

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2020	5.56	1.15	6.71	82.8	17.2	0.6	7.6
2021	5.62	1.19	6.81	82.5	17.5	1.1	3.3

In 2002, the artisanal, industrial, and marine fisheries production in Bangladesh were 3.90 hundred thousand metric tons, 0.25 hundred thousand metric tons, and 4.15 hundred thousand metric tons, respectively, while the percentage share of artisanal and industrial were 93.9% and 6.1% respectively. After 20 years, in 2021, the artisanal, industrial, and marine fisheries production turned at 5.62 hundred thousand metric tons, 1.19 hundred thousand metric tons, and 6.81 hundred thousand metric tons, respectively, while the percentage share of artisanal and industrial were 82.5% and 17.5% respectively. In the marine sector, the artisanal sub-sector is losing the share, but the industrial sub-sector is gaining the share. In 2003, the growth rate of the artisanal sub-sector was 3.5% while the rate was 11.1% for the industrial sub-sector. After 20 years, in 2021, the growth rate of the artisanal sub-sector turned to 1.1% while the rate turned to 3.3% for the industrial sub-sector. The minimum growth rate of artisanal fisheries was -0.7% in 2015 while the maximum growth rate was 4.6% in 2004. On the other hand, the minimum growth rate of industrial fisheries was -10.7% in 2019 while the maximum growth rate was 76.1% in 2012. The growth rate of industrial fisheries is more fluctuating than that of artisanal fisheries. As industrial fisheries are related to deep-sea fishing with high technology, high fluctuation in this fishery might be because of natural calamities in the Bay of Bangle, technological fluctuation, or any other reasons. Further study is required regarding the high fluctuation in the industrial fisheries growth rate in Bangladesh.

For a better understanding of artisanal, industrial, and marine fisheries production in Bangladesh, the study considers the basic statistical analysis in table 3.

Table 3: Descriptive Statistics of Marine Fisheries in Hundred Thousand Metric Ton

Descriptive Statistics	**Artisanal Yield**	**Industrial Yield**	**Total Marine Yield**
Observation Number	20	20	20
Minimum Value	3.90	0.25	4.15
Maximum Value	5.62	1.20	6.81
Range	1.72	0.95	2.66
Sum	97.96	13.19	111.14
Median	5.05	0.57	5.62
Mean	4.90	0.66	5.56
SE. Mean	0.11	0.08	0.19
CI. Mean (0.95)	0.24	0.17	0.39
Variance	0.26	0.13	0.71
Std. Deviation	0.51	0.36	0.84
Coef. Variance	0.10	0.55	0.15

The range of artisanal, industrial, and marine production is 1.72, 0.95, and 2.66, respectively, indicating the highest fluctuation in marine production followed by artisanal and industrial. The mean of artisanal, industrial, and marine production is 4.90, 0.66, and 5.56, respectively, which means, the average yearly production of artisanal, industrial, and marine is 4.90, 0.66,

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and 5.56 hundred thousand metric tons, respectively. In 20 years of marine production, from 2002 to 2021, the average contribution of artisanal fisheries was 88.1%, while the contribution of industrial fisheries was only 11.9%. The standard deviation of artisanal, industrial, and marine production is 0.51, 0.36, and 0.84, respectively, which means, marine production has the highest variability followed by artisanal and industrial.

Goal 14 of SDG is conserving and using sustainably the oceans, seas, and marine resources (United Nations, 2015). The study claim, although Bangladesh has a vast marine water area with enough biodiversity in the Bay of Bangla, the country is not had enough success to extract its marine resources. Further study is required regarding SDG goal 14 reality and potentiality in Bangladesh. At least 80% of marine fisheries production in Bangladesh comes from the artisanal sub-sector. Artisanal fisheries are extremely adaptive, so policymakers should take into account the issue before making any policy on artisanal fisheries.

4. CONCLUSION

In 2018, 64.5% of the world's fisheries production came from the marine sector, but in Bangladesh, only 15.3% of production came from the marine sector in the same year although the country has 118,813 km2, 81% of its total area, area in the Bay of Bangle. Bangladesh is not having enough success to extract its marine resources from the Bay of Bangle, so policymakers of the country should allocate more funds for research, technology, and human skill development to extract marine resources sustainably. In 2021, 82.5% of its marine fisheries came from the artisanal or small-scale fisheries sub-sector which is extremely adaptive.

This study only deals with the production volume of artisanal and industrial sub-sectors. Further study is required regarding the number of vessels used for fishing, boat size, boat setting, catch per boat or vessel, and knowledge of fishermen to handle the fishing fleet. There is a buzz in Bangladesh, fishermen do not obtain the logical or ethical price of fish due to market syndicates, middlemen, and long marketing channels. The future research scope includes the price received by fishermen is logical or not, and the economic impact of artisanal and industrial fisheries on socio-economic development in Bangladesh.

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