Opportunities of Young Fish Farmers in Indigenous Fish Farming: A village level study

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ARTICLE INFO	ABSTRACT
	Bangladesh is a country enriched with diverse fisheries resources and naturally productive wetlands. Indigenous fish plays an important role in diet and also a source of income for fish farmers. The main aim of the study was to determine the extent of opportunities for young fish farmers in indigenous fish farming. Melandah upazila under Jamalpur district was the locale of the study. The sample size of the study was 80 and it was drawn from a population of 266 using a simple random sampling technique. Data were collected from the selected sample farmers through face-to-face interview methods during 1-30 January 2023. The extent of opportunity was the dependent variable and a 4-point rating scale was used to measure it, while eleven selected characteristics of the respondents constituted the independent variables of the study. Pearson's Product Moment Correlation Coefficient (r) was computed to explore the relationship between the selected characteristics of the respondents. The findings revealed that more than three-fourths of the young fish farmers (78.8%) had adequate opportunities in indigenous fish farming. Transportation facilities came in first place among issues pertaining to opportunities, followed by locally available good-quality feed and fertilizers, which came in second and third, respectively. Age, experience in raising fish, annual family income, training exposure, contact with extension media, knowledge of indigenous fish farming, and skills in indigenous fish farming were all found to be significant influences on the extent of opportunities in indigenous fish farming. The Department of Fisheries and other development organizations should take the required steps to increase young fish farmers' opportunities to engage in indigenous fish farming and contribute to the national economy.

INTRODUCTION

Bangladesh is the world's fifth-largest aquaculture producer, the third-largest producer of inland fish, and the eleventh-largest producer of marine fish, according to the FAO (2019). It has an important role in alleviating protein deficiency, providing jobs for unemployed young people and earning foreign currency. This promising sector is also valued for its diversity. It has 260 kinds of freshwater indigenous fishes. Among the indigenous fish, Shing (*Heteropneustes fossilis*) and Magur (*Clarias batrachus*) are most delicious and demandable fish in Bangladesh. Pabda (*Ompok pabda*), Gulsha (*Mystus cavasius*), Tengra (*Mystus tengara*), Koi (*Anabas testudineus)* are very popular and palatable fishes. Besides these fishes, other indigenous fishes are also nutritious and acceptable than foreign carp fishes. But indigenous fishs are declined to a great extent over the years and many of them are rare or endangered. These fishes are endangered due to the excessive increase in foreign fish farming, climate change and man-made factors. Also due to overfishing, habitat fragmentation, siltation of freshwater bodies, environmental pollution from industries and agricultural chemicals, the percentage of indigenous fish had gradually decreased from 62.59% in 1884 to 28% in 2014 (DoF, 2020). According to IUCN (2019), 64 freshwater indigenous fish species are threatened. Floodplain fisheries are still the main sources of fish consumed by rural people, with indigenous fishes contributing the most. Indigenous fish species are high in vitamin A and D as well as calcium, phosphorus, iron, iodine, and other minerals (Rahman, 2009).

Bangladesh has become self-sufficient in fish production, offering 63 gm fish per person in daily dietary consumption, which is more than their daily protein demand (DoF, 2021). However, with the present trends of decreasing floodplain fisheries and increasing aquaculture, the total fish intake may fall and a larger proportion of indigenous fishes in Bangladeshi diet will be substituted by carp. According to BFRI (2020), has conserved and improved 37 indigenous varieties of freshwater fish, bringing hopes that endangered breeds can be preserved to satisfy both local and global demand. Around 5 lakh farmers are involved in cultivating indigenous fish breeds with the required fish fry being produced at more than 500 hatcheries and also BFRI established 'live gene bank' for the conservation of indigenous fish in 2020 and so far, 102 species have been included (BFRI, 2020). There have been revolutionary changes in fish farming through pond culture in Bangladesh (IFPRI, 2021) and 56% of fish in Bangladesh is actually coming from ponds due to advanced farming techniques and total fish production in the country has increased six fold in the last 34 years (BBS, 2020). As the population of the Bangladesh is increasing day by day as well as the demand of fish is increasing also.

The involvement of young fish farmers in aquaculture is higher in Bangladesh compared to other agricultural sub sectors due to high profitability. Fisheries sector is a major source of food and livelihoods in Bangladesh and attracting young fish farmers to the field is a path to family nutrition and economic security (Momen, 2010). Many young fish farmers in Bangladesh are still facing enormous challenges such as discrimination, unemployment, lack of educational opportunity, extreme poverty, migration and decent jobs (UNDP, 2016). In this situation, indigenous fish farming can play a vital role on need to creating economic activities and improves livelihoods for young generation. Through indigenous fish farming, innovative young fish farmers can increase indigenous fish production rate in Bangladesh and improve their socio-economic conditions. Indigenous fish farming as it is one of the wonderful sectors for young fish farmer's development in Bangladesh.

Indigenous fish farming, like other types of fish farming, may provide nutrition and food security while also creating income and job opportunities in Bangladesh (Shamsuzzaman et al., 2020). In light of the foregoing background and facts, it is said that young fish farmer possibilities in indigenous fish farming are critical to ensuring fish production and livelihood enhancement.However, a limited number of studies were conducted on rural young fish farmer's opportunities in Bangladesh and none of the studies was conducted on indigenous fish farming. Therefore, the present study was conducted to assess the extent of opportunities of young fish farmers in indigenous fish farming, to determine and describe the selected characteristics of young fish farmers in the study area and to explore relationship between young fish farmer's opportunities in indigenous fish farming with their selected characteristics.

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MATERIALS AND METHODS

Study area

The study was conducted in Melandah upazila under Jamalpur district. Three unions named Durmote, Kulia and Nayangar are selected purposively as a large number of young fish farmers were involved in indigenous fish farming activities.

Population and sample size

The total population was 266 young fish farmers. Among them, Thirty percent (30) of the total young fish farmers was selected as sample following random sampling technique. So, the sample size was 80.

Data collection and Statistical analysis

Data were collected from the study area through face to face interview with the selected young fish farmers. Before collection of data an interview schedule was prepared. Preliminary information about the area and situations of young fish farmers in indigenous fish farming activities were collected by discussion with upazila fisheries officer, upazila youth development officer and Local Extension Agent for Fisheries (LEAF). The Statistical Package for Social Science (SPSS) version 21 was used to perform the data analysis. Descriptive statistics such as number, percent, mean, standard deviation, range and rank order were used to whenever necessary. Pearson's Product Moment Correlation Co-efficient was used to explore the relationships between the concerned variables.

Measurement of the dependent variable

Opportunity of young fish farmers in indigenous fish farming was the dependent variable of the study. The extent of opportunities was measured by the level of opportunities in 20 selected activities. Each opportunity was measured by a 4-point rating scale. The score was assigned to each of the responses of young fish farmers as 3 for adequate, 2 for moderate, 1 for low and 0 for not at all (Kabir et al., 2022). By adding the assigned scores of 20 activities of a respondent together, the opinion of the young fish farmers in indigenous fish farming was obtained. Score of a respondent could range from 0 to 60. For better understanding about the selected 20 issues related to opportunities of young fish farmers in indigenous fish farming an opportunity index was calculated by the following formula (Patwari, 2008).

Opportunity index was computed using the following formula: Opportunity Index (OI) = $OI_{ad} \times 3 + OI_{md} \times 2 + OI_{lo} \times 1 + OI_{no} \times 0$

Where,

OI_{ad} = Opportunities of young fish farmers in indigenous fish farming is adequate
OI_{md} = Opportunities of young fish farmers in indigenous fish farming is moderate
OI_{lo} = Opportunities of young fish farmers in indigenous fish farming is low
OI_{no} = Opportunities of young fish farmers in indigenous fish farming is not at all

Thus, the value of Opportunity Index (OI) for each of the 20 activities could range from 0 to 240, where 0 indicates no opportunities and 240 indicates adequate opportunities.

RESULTS AND DISCUSSION

Present Status of Cultivating Indigenous Fish Species in the Study Area

Indigenous fish farming is getting popularity in Melandah upazila under Jamalpur district. Various kinds of indigenous fish species were found in the study area. Those cultivated indigenous fish species are listed in Table 1.

Selected characteristics of the fish farmers

Information contained in table 2 reveals that majority (85%) of the respondents were in the age group of emerging adulthood to transition to adulthood (24-35). In terms of educational qualification, the highest proportion (53.8%) of the respondents had secondary education, 21.3 percent had completed graduation, 15 percent had higher secondary and 10.0 percent had primary education. Above half (58.8%) of the respondents had medium (5–6) household size, 38.8 percent had small family size. The mean household size of the present study is 5.04 which is higher than the Bangladesh

national average household size of 4.26 (BBS, 2023). More than half of the respondents (57.5%) had high (above 10 years) fish farming experience. In terms of pond size, majority of the respondents (82.5%) had small to medium size ponds. The 65 percent of the respondents were in the category of high income compared to 2.5 percent under low income category and 32.5 percent fall under medium income category. The national per capita annual income is BDT 3,89,064 (BBS,2023) but average annual income of the respondents was found BDT 342130. Also, one third (66.3 %) of the respondents had short term training exposure and majority of the respondents (97.5%) had low level of organizational participation. Moreover, all of the respondents had medium to high extension media contact and they had medium to high knowledge in indigenous fish farming. Moreover, the 28.7% respondents had medium skills in indigenous fish farming and 71.3% had high skills in indigenous fish farming. In this study most of the respondents had high skills in indigenous fish farming.

Table 1. Cultivated indigenous fish species in the study area

Sl. No.	Bangla Name	Scientific Name
1	Koi	*Anabas testudineus*
2	Shingi	*Heteropneustes fossilis*
3	Magur	*Clarias batrachus*
4	Tengra	*Mystus tengara*
5	Gulsha	*Mystus cavasius*
6	Taki	*Channa punctatus*
7	Mola	*Amblypharyngodon mola*
8	Chapila	*Gudusia chapra*
9	Pabda	*Ompok pabda*

Relationship between selected characteristics of young fish farmers and their opportunities in indigenous fish farming

The selected eleven characteristics of young fish farmers age, farming experience, annual family income, training exposure, extension media contact, knowledge on indigenous fish farming, skills in indigenous fish farming were show positive and significant relationship while educational qualification, household size, pond size, organizational participation and attitude towards indigenous fish did not show any significant relationship with the opportunity in indigenous fish farming.

Opportunity of Young Fish Farmers in Indigenous Fish Farming

In this study, possible score for opportunities of young fish farmers in indigenous fish farming activities ranged from 0 to 60 where 0 denoted lowest opportunity and 60 denoted the highest opportunity and the observed score ranged from 35 to 55 with the mean of 44.23 and standard deviation of 4.210. Based on their opportunities scores the respondents were classified into three categories as shown in Table 4.

On the basis of score of opportunity in indigenous fish farming, the respondents classified into three categories as low opportunity (1-20), medium opportunity (21-40) and adequate opportunity (41-60). The majority (78.8%) of the respondents had high opportunity in indigenous fish farming activities compared to 21.3% had medium opportunity.

Comparison among the Individual Opportunity

Opportunity Index (OI) was calculated for better understanding about the opportunity in indigenous fish farming. The calculated Opportunity Index (OI) of the 20 activities ranged from 120 to 226 which were arranged in rank order according to their Opportunity Index (OI) which has been shown in Table 5. Data in Table 5 indicates that issues like availability of proper transportation facility for carrying all the necessary materials or selling fish products could play an important role to create opportunities for young fish farmers in indigenous fish farming. Furthermore, the availability of transportation allows them to sell their fish in good condition and supply fresh fish to the fish market. Locally available good quality feed and good quality fertilizers were also major issues which could play important role to create opportunities for young fish farmers. Locally available feed, locally available fertilizers create easy farming method for young fish farmers. Also available aqua drugs considered as an important issue which could expand the opportunities of young fish farmers in indigenous fish farming. Suitable pond for indigenous fish farming and suitable climate condition e.g. year-round sunlight, optimal rainfall is another important issue for indigenous fish farming.

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Table 2. Salient features of young fish farmers in the study area

Characteristics (Measuring units)	Range		Categories	Young fish farmers (n=80)		Mean	SD*
	Possible	Observed		No.	%		
Age (Years)	18-35	20-35	Adolescence (18-23)	12	15	28.53	4.237
			Emerging adulthood (24-29)	36	45		
			Transition to adulthood (30-35)	32	40		
Educational qualification (Years of schooling)	Unknown	4-18	Primary level (1-5)	8	10	10.43	3.669
			Secondary level (6-10)	43	53.8		
			Higher secondary (11-12)	12	15		
			Graduation (Above 12)	17	21.3		
Household size (Number)	Unknown	3-11	Small family (2-4)	31	38.8	5.04	1.267
			Medium family (5-8)	47	58.8		
			Large (above 8)	2	2.5		
Farming experience (Actual years)	Unknown	2-15	Low (1-5)	2	2.5	6.39	2.749
			Medium (6-10)	32	40		
			High (above 10)	46	57.5		
Pond size (Hectare)	Unknown	0.13-1.15	Moderately small (up to 0.2)	3	3.8	1.7084	1.6322
			Small (0.21 to 0.5)	30	37.5		
			Medium (0.51 to 1.00)	36	45		
			Large (above 1.00)	11	13.8		
Annual family income (000' taka)	Unknown	150-700	Low (0-150)	2	2.5	342.13	149.83
			Medium (151-300)	26	32.5		
			High (above 300)	52	65		
Training exposure (Days)	Unknown	0-90	No Training (0)	11	13.8	12.61	18.606
			Low (1-25)	53	66.3		
			Medium (26-50)	12	15		
			High (above 50)	4	5		
Organizational participation (Score)	0-21	0-12	Low (0-7)	78	97.5	1.94	2.184
			Medium (8-14)	2	2.5		
			High (15-21)	0	0		
Extension media contact (Score)	0-36	13-30	Low (0-12)	0	0	22.16	4.385
			Medium (13-24)	52	65		
			High (25-36)	28	35		
Knowledge on indigenous fish farming (Score)	0-30	14-25	Low (0-10)	0	0	20.46	2.614
			Medium (11-20)	39	48.8		
			High (21-30)	41	51.2		
			Moderately favorable (14-26)	58	72.5		
			Favorable (above 26)	22	27.5		
Skills in indigenous fish farming (Score)	8-40	27-38	Low skill (1-13)	0	0	32.89	3.077
			Medium skill (14-26)	23	28.7		
			High skill (above 26)	57	71.3		

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Table 3. Relationship between the selected characteristics of young fish farmers and the opportunities in indigenous fish farming

Dependent Variable	Independent variables	Correlation co-efficient 'r'-values with (78 df)	Tabulated 'r'-values significant at (78 df)	
			0.05	0.01
Opportunities of young fish farmers in indigenous fish farming	Age	0.305**		
	Educational qualification	0.102		
	Household size	0.060		
	Farming experience	0.334**		
	Pond size	0.144		
	Annual family income	0.265*		
	Training exposure	0.327**	0.220	0.287
	Organizational participation	0.149		
	Extension media contact	0.358**		
	Knowledge on indigenous fish farming	0.334**		
	Skills in indigenous fish farming	0.317**		

Notes: * Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed)

Table 4. Categorization of respondents on the basis of their opportunities in indigenous fish farming

Category	Range Observed (Possible)	Young Fish Farmers		Mean	Standard Deviation
		Number	Percent		
Low opportunity (1-20)		0	0		
Moderate opportunity (21-40)	35-55 (0-60)	17	21.3	44.23	4.210
Adequate opportunity (41-60)		63	78.8		

Table 5 shows that majority of respondents (82.5%) had adequate transportation facilities and 17.5% had moderate transportation facilities. Rickshaws, auto-rickshaws, CNGs, buses, easy bikes, taxicabs, train and all types of vehicles were available in the study area. Roads of this area were well constructed and also repaired. So, young fish farmers could easily sell their fish products. Similarly, available sources of good quality feed, fertilizers, aqua drugs, suitable pond for indigenous fish farming and suitable climate condition for indigenous fish farming were given major priority by the respondents for indigenous fish farming.

Lack of financial capital to start indigenous fish farming was one of the major obstacles for indigenous of fish farming. Only 2.5% respondents of young fish farmers had adequate opportunity and 52.5% respondents had low opportunity in financial capital to start indigenous fish farming in that study area. It was the main constrains for indigenous fish farming. Because young fish farmers had a little money to start indigenous fish farming and there was little involvement of capital for purchasing feed, fertilizers, aqua drugs and other inputs for indigenous fish farming. Access to fry supply and fair price of fish fry were also limited opportunities in indigenous fish farming. Sometimes they couldn't get healthy, good quality fry in proper time of farming. So, it was also an obstacle for indigenous fish farming. Available training facilities were also rare for young fish farmers. Proper knowledge on improved technique which helped for increase production of indigenous fish and decrease fish mortality was also a major constrain which hinders the opportunity of young fish farmers in indigenous fish farming at near future. Only 5% of the respondents had adequate knowledge on improved technique in indigenous fish farming and 42.5% of the respondents had low knowledge on indigenous fish farming.

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Table 5. Rank orders of 20 existing available issues in which young fish farmers could have possibility in indigenous fish farming

Existing available issues in which young fish farmers could have possibility in indigenous fish farming	Extent of Opportunities (n = 80)				Opportunity Index (OI)	Rank Oder
	Adequate (3)	Moderate (2)	Low (1)	Not at all (0)		
A. General opportunities						
Financial capital to start indigenous fish farming	2	36	42	0	120	20
Availability of training facility	16	49	15	0	161	13
Availability of unpaid family labor	37	29	14	0	183	10
Suitable climate condition	59	20	1	0	218	6
Extension services and updated information from UFO	9	55	15	1	152	14
Availability of LEAF	14	36	25	5	139	17
Easy access to visit upazila fisheries office	14	56	10	0	164	12
B. Cultural opportunities						
Suitable pond for indigenous fish farming	62	18	0	0	222	4
Availability of good quality fry	30	48	2	0	188	9
Access to fry supply	17	57	6	0	171	11
Fair price of fish fry	8	54	18	0	150	15
Locally available good quality feed	65	15	0	0	225	2
Locally available good quality fertilizers	64	16	0	0	224	3
Availability of aqua drugs in local market	60	20	0	0	220	5
Proper knowledge on improved techniques	4	36	34	6	118	19
C. Marketing opportunities						
Transportation facilities for selling fish products	66	14	0	0	226	1
Fair price in fish market	7	44	29	0	138	18
Consumer demand	51	25	4	0	207	7
Market facilities	10	46	24	0	146	16
Profitability in indigenous fish farming	42	28	10	0	192	8

CONCLUSION

Majority (78.8%) of young fish farmers had adequate opportunity in indigenous fish farming activities, while the remaining 21.2% had moderate opportunity in indigenous fish farming activities. Therefore, it may be concluded that opportunity of young fish farmers in indigenous fish farming was satisfactory in the study area. Age, farming experience, annual family income, training exposure, extension media contact, knowledge on indigenous fish farming, skills in indigenous fish farming had positive and significant relationship with their extent of opportunity in indigenous fish farming. It implies that, these economic and social characteristics of the young fish farmers could have reflective link on their opportunity in indigenous fish farming activities. All these characteristics were supportive to a great extent to motivate the young fish farmers in indigenous fish farming activities. Among twenty available issues related to opportunity of young fish farmers in indigenous fish farming, transportation facilities for selling fish products got ranked first; and locally available good quality feed; and locally available good quality fertilizers ranked second and third, respectively. On the other hand, financial capital to start indigenous fish farming, proper knowledge on improved techniques, fair price in fish market got the least positions. So, it can be concluded that these above-mentioned issues may be the indicators of opportunities of young fish farmers in indigenous fish farming. Availability of LEAF also got the least position in indigenous fish farming in the study area. LEAF is the major source for providing extension services and information regarding modern techniques about fish farming. So, opportunity of young fish farmers in indigenous fish farming activities cannot be increased without availability of LEAF.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interests regarding the publication of this paper.

ACKNOWLEDGEMENTS

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