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Farmers' switching behavior from crop to fish production: causes and consequences

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ABSTRACT

The major purposes of this research study were to determine the extent of switching behavior of the farmers from crop to fish production, determine the causes and consequences of farmers' switching behavior and also to explore the relationships between each of fifteen selected characteristics of the farmers and their extent of switching from crop to fish production. Data were collected from randomly selected 74 farmers of 12 villages of Shyamnagar and Kaligonj upazila under Satkhira district by using an interview schedule during the period from August 20 to November 25, 2021. Finding revealed that majority proportion (78.4 percent) of the farmers' switched crop production to fish production into a lower amount of land compared to 13.5 percent of them switched from crop to fish production into a medium amount of land and 8.1 percent of the farmers switched from crop to fish production into a high amount of land. In practical situation, all the potential area of a farmer was not switched from crop to fish production. According to cause index for switching from crop to fish production "higher profit in fish production ranked first cause" followed by "salinity problem for crop production", "irrigation problem in kharip season", "less production in crop cultivation", "climatic hazard", "less physical attachment in fish production" and "lower diversity in local cropping pattern". For switching from crop to fish production, farmers were facing some positive and negative consequences. According to consequences index in positive direction, "increasing economic return of the farmers" ranked first consequences followed by "increase pesticide free dyke vegetable cultivation" and "preservation of rainwater for future use". Based on consequence index in negative direction, "decreasing crop production" ranked first consequences followed by "increasing soil salinity after shrimp cultivation" and "high risk of return from fish production". Out of fifteen selected characteristics of the farmers, BCR from fish production, extension contact, fish production knowledge, fish production practices of the farmers had significant positive relationship with their switching behavior from crop to fish production, while age of the farmers had significant negative relationship with their switching behavior. Rest ten characteristics i.e. education, farm size, family size, BCR from crop production, crop production knowledge, organizational participation, cosmopolitanism, training exposure, problem faced in crop cultivation, problem faced in fish production, had non-significant relationship with their switching behavior from crop to fish cultivation. Advisory service providers of crop and fisheries sector should take necessary actions to increase crop and fisheries productivity logically in the study area for the betterment of the farmers and the country.

Key Words: *BCR (Benefit Cost Ratio); Causes; Consequences; Dyke vegetable cultivation and Salinity.*

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I. Introduction

Agriculture has been a way of life for people for long time back. Traditional farming systems, which considered earth as a living being, moved the way for modern agriculture. Switching from one practice to another was mainly because of the increased demand for basic needs, which forced people to adopt modern techniques like high yielding variety seeds, use of fertilizers etc. Major shift is projected in the suitable climate space of many crops across the globe due to climate change (Seo and Mendelsohn, 2008; Wang et al., 2010; Rippke et al., 2016). To avoid or reduce the potential loss in profit due to shifts in suitable climate spaces, farmers need to make appropriate adjustments, particularly crop switching. Studies in the past have examined the process of crop switching as an adaptation response and the factors that facilitate it. Most of these studies revealed whether farmers adapt by switching crops and what type of socio-economic and environmental factors influence the process (Maddison, 2007; Gbetibouo, 2009). This can be considered a key gap in the literature because certain types of switching decisions could be caused by non-climatic drivers such as price (Seo and Mendelsohn, 2008). Moreover, earlier studies do not focus on non-climatic variables appropriately (Below et al., 2012; Fosu-Mensah et al., 2010; Gbetibouo et al., 2010). Climate change affects countries, regions and communities in different ways and thus differ in terms of their adaptation strategies (Alam et al., 2017.). Brulle et al., (2012) said that the factors responsible for the variation in adaptive responses across regions are the agro-ecological system, socio-economics, climatic impact, and existing infrastructure and capacity. Previous academic attempts to take stock of the factors influencing farmers' adoption of sustainable practices (Kabii and Horwitz, 2006; Knowler and Bradshaw, 2007; Prokopy et al., 2008) did not specifically focus on the role of behavioral factors, often resulting in an incomplete overview and limited theoretical understanding of how and why these factors affect decision-making (Prokopy et al., 2008). Sheeder and Lynn (2011) indicate that non-financial considerations such as farmer value, attitudes and perception towards farming can play a role in the switching decision by farmers. Concerning cognitive factors, the areas that may deserve further attention are farmers' perceptions of the environmental and health-related costs of conventional practices, their beliefs about the market value of sustainable products (considering that farmers' clients are mostly intermediaries in the value chain rather than final consumers) and potential time discounting of the environmental benefits of sustainable practices (Weitzman, 1994) beyond financial benefits (Fisher and Krutilla, 1975). Sheth and Parvatyiar (2000) states that human switching behavior is based on the wish to reduce risk, and different strategies are used to achieve this. This study investigates why farmers switch from conventional farming methods to fish cultivation. Prior studies often consider crop switching as one type of adaptation response without attempting to disentangle the specific switching decisions primarily motivated by climate change. The following objectives have been formulated to guide the research: i) to assess the extent of farmers' switching behavior from crop to fish production; ii) to find out the causes and consequences of farmers' switching behavior from crop to fish production; iii) to determine and describe some selected characteristics of the farmers; iv) to explore the relationships between each of the selected characteristics of the farmers and their extent of switching behavior from crop to fish production.

II. Materials and Methodology

Sampling Technique

Kaliganj and Shyamnagar Upazila under Satkhira district was purposively selected as the locale of the study. Five unions namely Koikhali, Munshigonj, Kashimari, Romjannagar,and Krishnonagar were selected from the selected Upazillas. The crop to fish Production switched farmers under selected twelve villages were considered as the population of the study. About 25 percent of the population was selected proportionally from the selected villages as the sample by following random sampling method. Thus, the total sample size stood at 74.

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Data collection and analysis

Data were collected using a structured interview schedule. Pearson product moment coefficient was used in order to explore the relationship between the concerned variables. The age of a switched farmer was measured by counting the actual years from his/her birth to the time of interview. It was expressed in terms of complete years.

The education of a crop to fish Production switched farmers was measured by the number of years of schooling completed in an educational institution. A score of one (1) was given for each year of schooling completed. If a switched farmers didn't know how to read and write, his education score was zero, while a score of 0.5 was given to a switched farmers who could sign his name only. If a switched farmer did not go to school but studied at home or adult learning center, his education status was considered equivalent to a formal school student.

The family size was measured by the total number of members in the family of a respondent.
The farm size of a crop to fish Production switched farmer referred to the total area of land on which his/her family carried out farming operations for crop, livestock and fisheries production. The farm size was measured in Decimals for each crop to fish Production switched farmers using the following formula:

$FA=A_1+A_2+A_3$. (Where, FA= Farm Area; A_l = Cropping farm area; A_2= Livestock farm area; A_3= Fisheries farm area).

Benefit Total income of a switched farmers was measured in Thousand Taka.

BCR (Benefit Cost Ratio) = (B/C*100). (Where, B= Benefit, i,e, yearly income for fish production; C= Cost, i,e, expenditure for producing the fisheries).

The knowledge on crop Production score of the respondents could range from 0 to 18, where zero indicating very poor knowledge and 18 indicate very high knowledge on crop cultivation. The knowledge on fish production score of the respondents could range from 0 to 32, where zero (0) indicates very poor knowledge and 32 indicates very high knowledge of fish production. Two (2) score was assigned for each correct answer and zero (0) for wrong or no answer.

Each respondent was asked to indicate his/her Extent of participation in (year) of his contact with different organization as 'None', 'General member', 'Executive member', 'Officer of the executive committee 'of the selected organization. Weights were assigned to these alternative responses as follows: One (1) for one (1) year of General member. Two (2) for one (1) year of Executive member. Three (3) for one (1) year of Executive committee officer. Finally, Organizational participation score of a respondent was determined by adding all the weights against all the organizations.

The cosmopoliteness score of a respondent was determined by summing up his/her scores for visit at all the selected places. Thus possible cosmopoliteness score could vary from zero (0) to 12, where Zero indicated no cosmopoliteness and 12 indicated the highest level of cosmopoliteness.

The extension contact score of a respondent was determined by summing up his/her scores for contact with all the selected media. Thus possible extension contact score could vary from zero (0) to 32, where Zero indicates no extension contact and 32 indicates the highest level of extension contact.
Training exposure of a switched farmer was measured by the total number of days he/she participated in different training programs. A score of one (1) was assigned for each day of training received.

The problem faced score of a respondent was determined by summing up his/her scores for all the problems in crop production. Thus, possible score could vary from 'zero' (0) to 39, where Zero indicated no problem and 39 indicated the highest level of problem.

The problem faced in fish production score of a respondent was determined by summing up his/her scores for all the problems. Thus, possible score could vary from 'zero' (0) to 27, where Zero indicated no problem and 27 indicated the highest level of problem. This variable was measured by computing

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the extent of practices in fish culture of the respondents with 11 selected practices as obtained in response.

The Fish production practices score of a respondent was determined by summing up his/her scores for all the problems. Thus, possible score could vary from zero (0) to 33, where Zero indicated no problem and 33 indicated the highest level of farmers Fish production practices.

Switching behavior of farmers from crop to fish production was measured by using the following formulae:

S= (e/p X 100)

Where,

S= Switching behavior of the farmer
e= effective area, i,e, Area of land which farmer have changed from crop production area to fish production area (effective area, e).
p= potential area, i,e, Area of land which might be changed from crop production area to fish production area (potential area, p).

Indexing causes of switching from crop to fish production

The causes was listed down in a master sheet. Similar causes were merged together. Cause Index of switching from crop to fish was measured by using the following formulae:

$$\text{Cause Index} = \frac{\text{Number of citation of cause}}{\text{Total number of responden, i. e, 74}} \text{ X } 100$$

Indexing consequences of switching from crop to fish production

The consequences was listed down in a master sheet. Similar causes were merged together. Consequences Index of switching from crop to fish was measured by using the following formulae:

$$\text{Consequences Index} = \frac{\text{Number of citation of consequences}}{\text{Total number of respondent, i. e, 74}} \text{ X } 100$$

Rank order was made based on the descending order of cause and consequences index.

III. Results and Discussion

Switching behavior of the farmers from crop to fish production

The observed Farmers' Switching behavior from crop to fish production scores ranged from 4.31 to 91.38 percent against the possible range from 1 to 100, the mean and standard deviation were 25.05 and 19.79 respectively. The distribution of the farmers according to their switching behavior from crop to fish production is shown in Table 01.

Table 01. Distribution of crop to fish switched farmers according to their switching behavior

Categories according to Switching behavior from crop to fish production (scores)	Crop to fish switched farmers' (n=74)		Mean	Standard deviation (SD)
	Number	Percent		
Less switched (up to 33.33)	58	78.4	25.05	19.79
Medium switched (33.34 to 66.67)	11	13.5		
highest Switched" (above 40)	5	8.1		
Total	74	100		

Data in Table 01 revealed that majority proportion (78.4 percent) of the farmers' switched crop production to fish production into a low amount of land compared to 13.5 percent of them switched from crop to fish production into a medium amount of land and 8.1 percent of the farmers' switched from crop to fish production into a high amount of land. In practical situations, a farmer's potential area was not switched from crop to fish production.

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Causes and consequences of farmers' switching behavior from crop to fish production

Causes of farmers' switching behavior from crop to fish production

Farmers of Shyamnagar and Kaligonj Upazilla mostly cultivated shrimps, crab, saline tolerate different species of fishes like Vetki, Parse, Vangal and khorkullo and several types of crops. Recently they were switching there proportion of crop Production land into fish production land. Based on the descending order of rank order was made which is shown in Table 02

Table 02. Causes of farmers' switching behavior from crop to fish production

SL.No.	Causes	Cause Index	Rank order
1	Higher profit in fish production	97	1
2	Salinity Problem for crop production	95	2
3	Irrigation Problem in Kharip Season	93	3
4	Less Production in crop production	51	4
5	Climatic hazard	47	5
6	Less physical attachment in fish production	46	6
7	Lower diversity in local cropping pattern	34	7

Based on cause index "Higher profit in fish production ranked first cause" followed by "Salinity Problem for crop production", "Irrigation Problem in Kharip Season", "Less Production in crop production", "Climatic hazard", "Less physical attachment in fish production", "Lower diversity in local cropping pattern".

Consequences of farmers' switching behavior from crop to fish production

Farmers mentioned some positive and negative consequences of switching from crop to fish production. Based on descending order of Consequence Index rank order was made for positive and negative direction separately which are presented in Table 03.

Table 03. Consequences index of farmers' for switching from crop to fish production

SL.No.	Consequences	Consequence Index	Rank order
Positive Consequences			
1	Increasing economic return of the farmers	97	1
2	Increase pesticide free dyke Vegetable production	94	2
3	Preservation of rain water for future use	89	3
Negative Consequences			
4	Decreasing crop production	91	1
5	Increasing soil salinity after shrimp production	82	2
6	High risk of return from fish production	41	3

Based on consequence index, "Increasing economic return of the farmers" ranked first consequences in positive direction followed by "Increase pesticide free dyke Vegetable production" and "Preservation of rain water for future use". Thus "Decreasing crop production" ranked first consequences in negative direction followed by "Increasing soil salinity after shrimp production" and "High risk of return from fish production"

Selected Characteristics of farmers

Fifteen characteristics of the switching behavior of farmers were selected to find out their relationships with their switching behavior from crop to fish production. Salient features of these selected characteristics of the farmers are described in Table 04.

Age

The age of the crop to fish switched farmers ranged from 28 to 67 years, the average being 46.03 years and the standard deviation was 10.09. The highest proportion (41.9 percent) of the crop to fish Switched farmers were middle aged compared to 39.2 percent of them being old and only 18.9 percent young. The overwhelming majority (81.1 percent) of the crop to fish Switched farmers were young to old aged. This means that crop to fish Switching behavior in the study area is being controlled by comparatively older farmers.

Education

The education score of the crop to fish Switched farmers ranged from (0-17), with an average of 6.70 and standard deviation of 3.71. It is evident from Table 04 that the highest proportion (43.2 percent)

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of the crop to fish switched farmers had education up to primary level compared to 40.6 Secondary level education. About 2.7 percent had graduation level education and 2.7 percent farmers were illiterate. The proportion of crop to fish switched farmers having higher secondary levels was 10.8 percent. Thus, the over whelming majority (97.3 percent) of the crop to fish switched farmers were literate, ranging from primary to graduation level.

Table 04. Salient features of the selected characteristics of the farmers (n=74)

Characteristics	Range		Categories	Farmers		Mean	SD
	Possible	Observed		Number	%		
Age	-	28-67	Young (up to 35)	14	18.9	46.03	10.09
			Middle aged (36-50)	31	41.9		
			Old (Above 50)	29	39.2		
Education	-	0-17	Illiterate (0)	2	2.7	6.70	3.71
			Primary level (1-5)	32	43.2		
			Secondary level (6-10)	30	40.6		
			Higher secondary level (11-12)	8	10.8		
			Graduation (Above 12)	2	2.7		
Family Size	-	2-11	Small family (Up to 4)	32	43.3	5.04	1.82
			Medium family (5-7)	34	45.9		
			Large family (above 7)	8	10.8		
Farm Size	-	63-1157	Small (Up to 100)	18	24.3	191.18	161.56
			Medium (100-300)	48	64.9		
			Large (Above 300)	8	10.8		
BCR from crop production	-	1-3	Low BCR (Up to 1.5)	11	14.9	1.90	0.391
			Medium (1.51 to 2)	45	60.8		
			High (Above 2)	18	24.3		
BCR from Fish production	-	1-5	Low BCR (Up to 1.5)	2	2.7	2.51	0.693
			Medium (1.51 to 2)	10	13.5		
			High (Above 2)	62	83.8		
Crop production knowledge	0-18	10-18	Low (Up to 14)	16	21.6	16.04	1.82
			Medium (15 to 17)	34	45.9		
			High (Above 17)	24	32.5		
Fish production Knowledge	0-32	10-28	Low (Up to 16)	16	21.6	18.32	3.69
			Medium (17 to 22)	48	64.9		
			High (Above 22)	10	13.5		
Organizational Participation	-	0-27	Low (Up to 6)	15	20.3	12.22	6.39
			Medium (7 to 18)	47	63.5		
			High (Above 18)	12	16.2		
Cosmopolitanism	0-12	0-9	Low (Up to 4)	24	32.4	5.57	2.08
			Medium (5 to 8)	42	56.8		
			High (Above 8)	8	10.8		
Extension Media contact	0-32	2-22	Low contact (up to 7)	22	29.7	10.49	3.70
			Medium contact (8 to 14)	47	63.5		
			High contact (above 14)	5	6.8		
Training	-	0-8	Non trained (0 day)	52	70.3	0.77	1.42
			Medium training (0-2 days)	18	24.3		
			Highest training ” (above 2 days)	4	5.4		
Problem faced in Crop production	0-39	22-34	Less problem (up to 26)	6	8.1	29.28	2.35
			Medium problem (27 to 30)	51	68.9		
			Highest (above 30)	17	23		
Problem faced in Fish production	0-27	16-24	Less problem (up to 18)	17	23	20.26	2.07
			Medium problem (19 to 22)	47	63.5		
			Highest (above 22)	10	13.5		
Fish production practices	0-33	14-33	Low practice” (up to 18)	14	18.9	23.10	5.03
			Medium practice” (19 to 28)	47	63.5		
			highest practice” (above 28)	5	17.6		
			Valid N (list wise) =74				

Family size

The Family size of the crop to fish Switched farmers ranged from 2 to 11 person, the average being 5.04 person and the standard deviation was 1.82. It is evident from the Table 04 that the highest

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proportion (45.9 percent) of the Crop to fish Switched farmers belong to the medium family compared to (43.3 percent) had small family and (10.8 percent) farmer had large family. Thus, overwhelming majority (89.1 percent) of the farmers had small to medium family size.

Farm size

The land possession of the crop to fish switched farmers ranged from 63 to 1156 decimals and the mean was 191.17 decimals with standard deviation of 161.56. About two-third (64.9 percent) of the farmers had medium farm size whereas 24.3 percent had small farm size. It might be that the farmers in the study area were facing land erosion due to tidal surges resulting from cyclones, a flood that appeared comparatively every year in coastal areas.

BCR from Crop production

The switched farmer get Benefit Cost Ratio (BCR) from crop Production ranged from 1 to 3, with an average of 1.9 and a standard deviation of 0.39. Most (60.8 percent) farmers got medium BCR from crop production. Compare to 24.3 percent of the farmer got high BCR and 14.9 percent of farmers got low BCR from crop production. Lower BCR indicates that farmers get low returns from crop production.

BCR from Fish production

The switched farmer get Benefit Cost Ratio (BCR) from fish Production ranged from 1 to 5, with an average of 2.51 and the standard deviation of 0.693. Most farmers (83.8 percent) got high BCR from fish production. Compare to 13.5 percent farmers got medium BCR and farmers got low BCR from fish Production. Average BCR from fish production (2.5) was higher than average BCR from crop production (1.9), which might cause the farmers to switch from crop to fish production. From Table 04 it was observed that the BCR from fish production (2.51) was higher than the BCR from crop production (1.90). It might be the cause for switching from crop to fish production.

Crop production knowledge

The switched farmers' crop production knowledge ranged from 10 to 18 against the possible range from 0 to 18. The average being 16.04 and the standard deviation was 1.82. The majority (45.9 percent) of the crop to fish switched farmers' have Medium knowledge compared to (32.5 percent) farmers who have high knowledge and rest 21.6 percent farmers have low knowledge of crop production.

Fish Production Knowledge

The switched farmers' fish Production knowledge ranged from 10 to 28 against the possible range from 0 to 36. The average being 16.04 and the standard deviation was 1.82. The majority (64.9 percent) of the crop to fish switched farmers' had Medium knowledge of fish production. Compared to (13.5 percent) farmers had high fish production knowledge and (21.6 percent) farmers' had low knowledge of fish production.

Organizational participation

The switched farmers' organizational participation ranged from 0 to 27. The average was 12.21 and the standard deviation was 6.39. The majority (63.5 percent) of the crop to fish switched farmers' had Medium organizational participation compared to 16.2 farmers with high organizational participation and the rest 20.3 percent have low organizational participation.

Cosmopoliteness

The cosmopoliteness score of the switched farmers ranged from 0 to 9 against the possible range of 0 to 12 with the mean of 5.56 and standard deviation of 2.08. Majority proportion (56.8 percent) of the crop to fish switched farmers had medium cosmopoliteness compared to 32.4 percent and 10.8 percent have low and high cosmopoliteness respectively.

Extension contact

The observed extension contact scores of the crop to fish switched farmers' ranged from 2 to 22 against the possible range from 0 to 22, the mean and standard deviation were 10.48 and 3.70 respectively. Majority proportion (63.5 percent) of the crop to fish switched farmers had medium extension contact compared to 29.7 percent of them had low extension contact. Only 6.8 percent of

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them had high contact. Thus, overwhelming majority (93.2 percent) of the crop to fish switched farmers had low to medium extension contact. Extension contact is a very effective and powerful source of receiving information about various new and modern technologies.

Training exposure

The training exposure score of the switched farmers ranged from 0 to 8, with a mean of 0.77 and standard deviation of 1.42. Majority proportion (70.3 percent) of the crop to fish switched farmers do not receive any training while the rest 29.79 percent of them received low to medium duration training.

Problem faced in crop production

Problem faced in crop production scores of the crop to fish switched farmers ranged from 22 to 34 against the possible range from 0 to 39, the mean and standard deviation were 29.28. More than two third (68.9 percent) of the farmers faced medium problem in crop production compared to 23 percent farmers and (8.1 percent farmer) faced high problem in crop production.

Problem faced in Fish production

Problem faced in fish production scores of the crop to fish switched farmers ranged from 16 to 24 against the possible range from 0 to 27, the mean and standard deviation were 20.25 and 2.07 respectively. Majority (63.5 percent) farmer faced medium problem compared to 23 percent farmers faced less problem and rest 13.5 percent farmers faced highest problem in fish production. From the Table 04, it was found that the mean problems faced by the farmers in crop production was 29.28 against the highest possible problem score of 39,i.e, the farmers faced problems in crop production as 75.01%. Again, the mean problems faced by the farmers in fish production was 20.26 against the highest possible score of 27,i.e, the farmers faced problems in fish production as 75.05%. It means that the extent of farmers' problem in crop and fish production was similar. But the BCR from fish production was higher than the BCR from crop production, which motivated the farmers to switch from crop to fish production.

Fish production practices

The observed fish production practices scores of the crop to fish switched farmers ranged from 14 to 33 against the possible range from 0 to 33, the mean and standard deviation were 23.09 and 5.03 respectively. Majority proportion (63.5 percent) of the crop to fish switched farmers had medium fish production practices compared to 18.9 percent of them had low fish production practice. Only 17.6 percent of the farmers had high fish production practices.

Relationship of the selected characteristics of the farmers with their switching behavior from crop to fish production

Age and switching behavior of farmers from crop to fish production

Vast majority (81.1 percent) of the farmers were middle aged to old aged. This seems that switched farmers from crop to fish Production in the study area is being managed by comparatively older farmers. The findings indicated that age of the farmers had significant negative relationship with their switching behavior from crop to fish production.

Education and switching behavior of farmers from crop to fish production

The overwhelming majority (83.8 percent) of the farmers had education ranging from primary to secondary level. The findings indicated that education of the farmers had non-significant relationship with their switching behavior from crop to fish production.

Family size and switching behavior of farmers from crop to fish production

Majority (89.2 percent) switched farmers from crop to fish production belong to the small family to medium family. Family size of the farmers had no significant relationship with their switching behavior from crop to fish production.

Farm size and switching behavior of farmers from crop to fish production

About two-third (64.9 percent) of the farmers had medium farm size where 24.3 percent had small farm size. Farm size of the farmers had no significant relationship with their switching behavior from crop to fish production.

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BCR from crop production and switching behavior of farmers from crop to fish production
The majority (60.8 percent) of the farmers got medium BCR from crop production. Compare to 24.3 percent of the farmer got high BCR and 14.9 percent farmers got low BCR from crop production. BCR from crop production of the farmers had no significant relationship with their switching behavior from crop to fish production.

BCR from fish production and switching behavior of farmers from crop to fish production
The majority farmer (83.8 percent) got high BCR (1.51 to 2) from fish cultivation. On the other hand farmer (16.2 percent) got low to medium BCR in fish cultivation. From Table 04 it was observed that the BCR from fish production (2.51) was higher than the BCR from crop production (1.90). It might be the cause for switching from crop to fish production. BCR from fish production of the farmers had significant relationship with their switching behavior from crop to fish production.

Table 05. Co-efficient of correlation (r) of selected characteristics of the crop to fish Production switched farmers' with their percent of switching from crop to fish Production (n=74)

Characteristics of the Farmers	Correlation of co-efficient (r) with percent of switching from crop to fish production
Age	-0.285*
Education	0.018NS
Family Size	0.083 NS
Farm Size	0.134 NS
BCR from crop production	-0.033NS
BCR from Fish production	0.528**
Crop production knowledge	0.153NS
Fish production Knowledge	0.290*
Organizational Participation	-0.036 NS
Cosmopolitanism	-0.104 NS
Extension media contact	0.410**
Training	-0.033 NS
Problem faced in Crop production	-0.086 NS
Problem faced in Fish production	-0.089 NS
Farmer participated practices	0.535**

NS Not significant, * Significant at 0.05 level of probability, ** Significant at 0.01 level of probability

Crop production knowledge and switching behavior of farmers from crop to fish production
Crop to fish switched farmers' (45.9 percent) have Medium knowledge compared to (32.5 percent) farmers have high knowledge and rest 21.6 percent farmers have low knowledge on crop production. Crop production knowledge of the farmers had no significant relationship with their switching behavior from crop to fish production.

Fish production knowledge and switching behavior of farmers from crop to fish production
Switched farmers' (64.9 percent) had Medium knowledge of fish production. Compared to (13.5 percent) farmers had high fish production knowledge and (21.6 percent) farmers' had low knowledge of fish production. Fish production knowledge of the farmers had significant relationship with their switching behavior from crop to fish production.

Organizational participation and switching behavior of farmers from crop to fish production
The majority (63.5 percent) of the crop to fish switched farmers' had Medium organizational participation compared to 16.2 farmers had high organizational participation and rest 20.3 percent have low organizational participation. The findings indicated that organizational participation of the farmers had no significant relationship with their switching behavior from crop to fish production.

Cosmopolitanism and switching behavior of farmers from crop to fish production
Majority proportion (56.8 percent) of the crop to fish switched farmers had medium cosmopoliteness compared to 32.4 percent and 10.8 percent have low and high cosmopoliteness respectively. The findings indicated that cosmopolitanism of the farmers had no significant relationship with their switching behavior from crop to fish production.

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Extension contact and switching behavior of farmers from crop to fish production
Only 6.8 percent of them had high contact. On the other hand 63.5 percent of the switched farmers had medium extension contact compared to 29.7 percent of them had low extension contact. Extension media contact of the farmers had significant relationship with their switching behavior from crop to fish production.

Training exposure and switching behavior of farmers from crop to fish production
About 70.3 percent of the crop to fish switched farmers' do not receive training while the rest 29.79 percent of them received training. Training exposure of the farmers had no significant relationship with their switching behavior from crop to fish production.

Problem faced in crop production and switching behavior of farmers from crop to fish production
The switched 68.9 percent farmers faced medium problem in crop production compared to 23 percent farmers and (8.1 percent farmer) faced high crop production problems. Problem faced in crop production of the farmers had no significant relationship with their switching behavior from crop to fish production.

Problem faced in fish Production and switching behavior of farmers from crop to fish production
Majority (63.5 percent) farmer faced medium problem compared to 23 percent farmers faced less problem and rest 13.5 percent farmers faced highest problem in fish production. The findings indicated that problem faced in fish Production of the farmers had no significant relationship with their switching behavior from crop to fish production.

Fish production practices and switching behavior of farmers from crop to fish production
Majority proportion (63.5 percent) of the crop to fish switched farmers had medium fish production practices compared to 18.9 percent of them had low fish production practice. Only 17.6 percent of the farmers had high fish production practices. The findings indicated that participated practices of the farmers had significant relationship with their switching behavior from crop to fish production.

IV. Conclusion

Finding revealed that most (91.9 percent) of the farmers switched from crop production to fish production to a lower to medium amount of land. All the potential area of a farmer was not switched from crop to fish production. Farmers' ages had a negative significant relationship with their switching behavior from crop to fish production. BCR from fish production, extension contact, fish production knowledge and fish production practices of the farmers had significant positive relationship with their switching from crop to fish production. According to cause index for switching from crop to fish production "higher profit in fish production ranked first cause," followed by "salinity problem for crop production", "Irrigation problem in kharip season", "less production in crop cultivation", "climatic hazard", "less physical attachment in fish production" and "Lower diversity in local cropping pattern". According to consequences index in positive direction, "increasing economic return of the farmers" ranked first consequences followed by "Increase pesticide free dyke vegetable cultivation" and "preservation of rainwater for future use". In the negative direction, "Decreasing crop production" ranked first consequences, followed by "Increasing soil salinity after shrimp cultivation" and "high risk of return from fish production".

V. References

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