



Farmers' Perception towards Transformation of Rice-based Cropping System into Tea Garden

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ABSTRACT

Transformation of agricultural lands into non-farm lands or plantations has got tremendous ecological chaos and ripples. Northern part of West Bengal is undergoing rapid changes in rural areas where new opportunities are emerging in the form of demand-driven and market-driven agriculture. Due to persistent low returns from traditional rice cultivation, the transformation of paddy fields into tea gardens has been a recent trend for this part of West Bengal. The present study has been conducted by selecting purposively three blocks from Alipurduar district and sixty respondents through random sampling, those who have already transformed their crop field into tea gardens from these blocks. The farmers' perception towards transformation is taken as dependent variable along with a score of fourteen independent variables. The responses are collected through a structured interview schedule. The study envisaged that the farmers' education level, number of family members engaged in the garden, their economic motivation, sources of information, risk orientation behaviour and distance from the tea processing factory showed significant contribution towards the transformation behaviour. The future impact of such transformation on the ecological dynamics in terms of livelihood, biodiversity restoration and ecological resilience can be brought under policy frameworks.

INTRODUCTION

Agricultural transformation has been a powerful approach to eradicate poverty and promoting economic stability over a few decades. Farming sector has evolved from a subsistence based labour intensive economy to a modernized, capital and knowledge intensive system. The transformation of traditional agricultural lands into plantation viz., coffee gardens, tea gardens, cardamom gardens (Sreeja et al., 2021), rice-shrimp or grass-cattle based integrated farming systems and a move from on-farm to more off-farm or non-farm incomes (Thanh et al., 2021) has got tremendous ecological chaos and ripples.

Since the earlier few decades, rice-based farming experiences a drastic reduction in yield loss which increases urban migration of the labour and shifting towards other non-farm activities. This trend

has gone up with the gradual decline of income from agriculture, non-availability of labour for farming, an increase of cost of input in agriculture, and rising expectations for an occupation that will be away from agriculture. It becomes important to promote the rural transformation to create more employment opportunities in the local situation which helps in improving the social condition of the local people (Haque et al., 2020a) and to check the migration (Ge et al., 2020).

Tea gardens have a distinctive ecological behaviour and produce a promising return. It increases biological activity including addition of organic matter, changing biodiversity (Haque et al., 2020b), and improves the quality of surface and groundwater by reducing erosion and salinity (Wenner, 2011). Although increasing numbers of tea garden can hamper the supply of some ecosystem services with a risk of threat to sustainability and human well-being and economic

paybacks are fails to compromise the environmental cost (Su et al., 2017). It is important to facilitate the farmer as an entrepreneurial actor in the strategic decision-making process who interacts with the farm's socio-material context (Methorst et al., 2017). The farmers in their initial stage have to face some difficulties which can be overcome through the development of entrepreneurial skills such as innovativeness, risk-taking, and opportunity seeking behaviour (Deka & Goswami, 2020). Apart from the initial capital for planting and land preparation, it does not require substantial investments subsequently and the risk of crop failure is limited to very sporadic pest attacks and natural calamities (Tea Board of India, 2009).

Although 83.55 per cent of small and marginal tea growers having less than four hectares of landholdings (Hannan, 2019) they got success in generating income, not only for themselves but also for the unemployed mass populations around them (Borthakur, 2019). Henceforth a similar study also reveals that the newly formed tea growers are suffering from a lack of technical knowledge (Rahman et al., 2020).

The present study focuses on the drivers persuading the farmers to transform their established farming practices towards tea gardens. It may help in terms of planning and implementing measures to enhance output and economic return of small tea growers.

METHODOLOGY

The study is conducted in Falakata, Madarihata, and Alipurduar-1 blocks of Alipurduar district of West Bengal. Alipurduar district, as well as blocks, are selected purposively because these areas are one of the major tea cultivating regions in Dooars in North Bengal. Conversion of croplands to tea gardens is a typical occurrence in the studied region. The tea growers who are already engaged in the conversion of farmland into tea gardens are targeted for the study. The total number of sixty respondents, twenty from each block has been selected through random sampling method. Data are collected between January to March of 2019 through structured interview schedule using face to face interactions. The study of farmers' perception towards transformation of rice-based cropping system in tea garden being operationalized and measured in the following manner: (i) independent variables and (ii) dependent variable. The dependent variable, perception of farmers towards transformation (y) is computed through a five-point rating scale where score five defines the highest perception value and score one defines the lowest perception value respectively with six statements prepared by the researcher. The collected data are analysed through both descriptive and multivariate analysis. Statistical Package for the Social Sciences v20.0 (SPSS) of IBM and online statistical tool OPSTAT (Sheoran et al., 1998) are used for analysing the coefficient of correlation, multiple regression, stepwise regression, and path analysis.

RESULTS AND DISCUSSION

Farmers' perception towards transformation

It is well known fact that farmers' perception towards transformation of their farmlands into orchard based tea garden

depends on some predictor variables. For the present study, fourteen independent variables have been studied through a structured interview schedule which is shown in Table 1. The study reveals that the majority of the farmers belong to the middle age category (mean 43.267 years), education level is quite high (mean 9.650 years) at the almost secondary level. Most of the farmers belong to the category of small farmers as the average cultivated land area is 1.241 hectare. The study also reveals that the farmers who perceived to transformed their farming practices towards tea garden have a good experience in tea gardening, high economic motivation, and risk orientation attributes. So the farmers' entrepreneurial abilities are identified from the present study.

Table 1. Descriptive statistics with respect to mean and standard deviation of selected independent variables (x_1 - x_{14})

Independent Variables	Mean	SD
Age (x_1)	43.267	9.038
Education (x_2)	9.650	3.584
Family size (x_3)	6.767	2.020
No of family labour (x_4)	5.150	1.665
Cultivated land area (x_5)	1.241	0.267
Experience in tea garden (x_6)	9.000	3.184
Distance from tea processing factory (x_7)	6.342	3.194
Economic motivation (x_8)	12.933	3.560
Ancillary plant ratio (x_9)	4.498	1.866
Pesticides use ratio (x_{10})	1.715	0.720
Fertilizer use ratio (x_{11})	0.462	0.193
Garden age (x_{12})	9.633	2.923
Sources of information (x_{13})	2.317	0.965
Risk orientation (x_{14})	15.300	5.328

Standard deviation = SD

Relation between farmers' perception towards transformation and other selected variables

Perception is the process of transmission of stimulation through organized experiences (Epstein et al., 2018). Any kind of perception has a wide relationship between societal, economical as well as environmental factors. Conventional farming practices have felt to provide adequate income due to several factors. The degree of linear associations between the perception of farmers towards transforming their farmlands along with fourteen selected independent variables is presented in Table 2. The study revealed that there is a positive correlation between the perception of farmers and their education, economic motivation, source of information, and risk orientation. That means the farmers with higher education levels along with highly economically motivated, have the access to greater sources of information and the ability to take greater risk to have a higher perception level towards transformation. Apart from this, distance from the tea processing factory is negatively correlated with the perception also implies that the farmers who are nearer to tea factory have higher level of perception. A similar study also confirms that family size, distance to the market, economic motivation, risk orientation, innovativeness and scientific orientation are shows strongly positive correlation with crop diversification (Ghouse & Hassan, 2020).

Table 3 depicts the multiple regression analysis of perception of farmers towards transformation (y) vs. 14 independent variables (x_1 - x_{14}). The model shows that the independent variables can

Table 2. Coefficient of correlation between perception of farmers towards transformation (y) and selected independent variables (x₁-x₁₄)

Independent variables	r value	Remarks
Age (x ₁)	-0.007	
Education (x ₂)	0.415	**
Family size (x ₃)	0.132	
No of family labour (x ₄)	0.299	*
Cultivated land area (x ₅)	-0.027	
Experience in tea garden (x ₆)	0.070	
Distance from tea processing factory (x ₇)	-0.415	**
Economic motivation (x ₈)	0.350	**
Ancillary plant ratio (x ₉)	0.152	
Pesticides use ratio (x ₁₀)	0.075	
Fertilizer use ratio (x ₁₁)	-0.165	
Garden age (x ₁₂)	0.227	
Sources of information (x ₁₃)	0.582	**
Risk orientation (x ₁₄)	0.294	*

*Correlation is significant at the 0.05 level, **Correlation is significant at the 0.01 level

explain almost 66.90 per cent (*R square* = 0.669) of the dependent variable. The variables education (*p*<0.01), garden age (*p*<0.05), and sources of information (*p*<0.001) significantly contribute to farmers' perceptions. The standardized coefficient beta value of these three explain that for one unit changes in these variables contribute 0.372, 0.281, and 0.499 unit changes in perception of farmers. To elaborate the study, stepwise regression analysis (Table 4) has been performed which depicts that sources of information (*p*<0.001), education (*p*<0.001), garden age (*p*<0.001), and distance from tea processing factory (*p*<0.05) are strongly significant with the farmers'

perception towards transformation. The stepwise regression model can explain 61.90 per cent of the dependent variable (*R square* =0.619). The findings from other studies also suggest that information from neighbours along with high relative income, and good marketing channels are the main actors of their transformation towards tea gardening (Ghosh et al., 2017).

Decomposition of total effects into direct and indirect effect of independent variables on perception of farmers towards transformation

The path analysis decomposes the total effects into direct, indirect, and residual effect on selected independent variables. Source of information presents the highest positive total effect (0.582) and direct effect (0.500), whereas no. of family labour shows the highest positive indirect effect (0.289) (Figure 1). The variable distance from tea processing factory and education represent the second highest total effect (-0.415, 0.415) but the former have negative and later have positive impact. Education (0.372) and garden age (0.282) comes under second and third ranks in terms of positive direct effect. The variables no of family labour (0.289) and risk orientation (0.261) ranks second and third in terms of positive indirect effect. Out of the fourteen independent variables, five variables each have highest indirect effect on perception of farmers towards transformation through education and Sources of information which are depict in Table 5. The sources of information are one of the crucial factors for any kind of perception. The study reveals that localite, as well as cosmopolite

Table 3. Multiple Regression analysis in predicting perception of farmers towards transformation (y) using selected independent variables (x₁-x₁₄)

Variables	Unstandardized Coefficients		Standardized Coefficients	t value	Sig.
	Reg. Coeff. B	S.E. B	Beta		
Age (x ₁)	-0.047	0.050	-0.091	-0.929	0.358
Education (x ₂)	0.481	0.130	0.372	3.699	0.001
Family size (x ₃)	0.040	0.300	0.017	0.134	0.894
No of family labour (x ₄)	0.028	0.398	0.010	0.071	0.944
Cultivated land area (x ₅)	-1.565	1.784	-0.090	-0.877	0.385
Experience in tea garden (x ₆)	0.054	0.147	0.037	0.368	0.715
Distance from tea processing factory (x ₇)	-0.284	0.161	-0.196	-1.769	0.084
Economic motivation (x ₈)	0.147	0.143	0.113	1.029	0.309
Ancillary plant ratio (x ₉)	0.117	0.240	0.047	0.486	0.630
Pesticides use ratio (x ₁₀)	-0.521	0.600	-0.081	-0.868	0.390
Fertilizer use ratio (x ₁₁)	-2.613	2.365	-0.109	-1.105	0.275
Garden age (x ₁₂)	0.446	0.175	0.281	2.555	0.014
Sources of information (x ₁₃)	2.398	0.471	0.499	5.092	0.000
Risk orientation (x ₁₄)	0.029	0.086	0.033	0.338	0.737

R square = 0.669, Adjusted R Square =0.566, Standard error of the estimate = 3.053

Table 4. Stepwise regression analysis in predicting perception of farmers towards transformation (y) using selected independent variables (x₁-x₁₄)

Variables	Unstandardized Coefficients		Standardized Coefficients	t value	Sig.
	Reg. coeff. B	S.E. B	Beta		
Sources of information (x ₁₃)	2.469	0.409	0.514	6.034	0.000
Education (x ₂)	0.495	0.112	0.382	4.403	0.000
Garden age (x ₁₂)	0.470	0.140	0.296	3.351	0.001
Distance from tea processing factory (x ₇)	-0.330	0.127	-0.227	-2.593	0.012

R square =0.619, Adjusted R Square =0.592, Standard error of the estimate = 2.962

Table 5. Decomposition of total effect into direct, indirect and residual effect perception of farmers towards transformation (y) vs. 14 independent variables (x_1-x_{14})

Variables	TE	DE	IE	HIE
Age (x_1)	-0.007	-0.091	0.084	0.083 (x_{12})
Education (x_2)	0.415	0.372	0.043	0.07 (x_{13})
Family size (x_3)	0.132	0.017	0.115	0.056 (x_{12})
No of family labour (x_4)	0.299	0.011	0.289	0.101 (x_{13})
Cultivated land area (x_5)	-0.027	-0.090	0.063	0.101 (x_2)
Experience in tea garden (x_6)	0.070	0.037	0.033	0.074 (x_{12})
Distance from tea processing factory (x_7)	-0.415	-0.196	-0.219	0.079 (x_{13})
Economic motivation (x_8)	0.350	0.113	0.237	0.117 (x_2)
Ancillary plant ratio (x_9)	0.152	0.047	0.105	0.059 (x_2)
Pesticides use ratio (x_{10})	0.075	-0.082	0.157	0.098 (x_{13})
Fertilizer use ratio (x_{11})	-0.165	-0.109	-0.056	0.053 (x_7)
Garden age (x_{12})	0.227	0.282	-0.055	-0.081 (x_2)
Sources of information (x_{13})	0.582	0.500	0.082	0.053 (x_2)
Risk orientation (x_{14})	0.294	0.033	0.261	0.116 (x_{13})

Total Effect = TE; Direct Effects = DE; Indirect Effects = IE; Highest Indirect Effects = HIE
Residual effect: 0.330 %

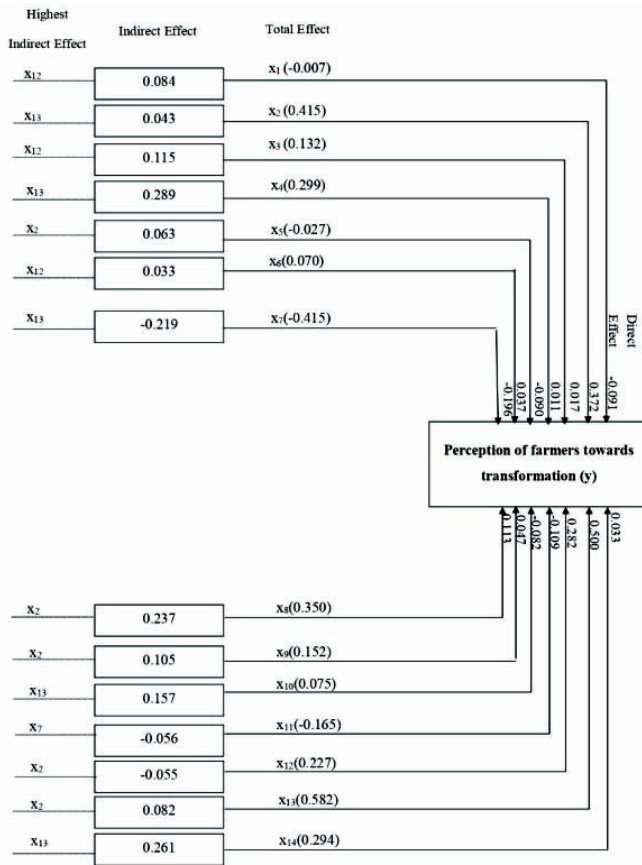


Figure 1. Path analysis showing direct, indirect effect and highest indirect effect of independent variables on perception of farmers towards transformation

sources, play an important role to motivate farmers to transform their traditional farming activities towards market driven orchard based tea garden farming whereas similar research on dairy farmers revealed that the entrepreneurial behaviour was played a crucial role in knowledge and adoption of scientific dairy practices in Maharashtra (Khode et al., 2021).

CONCLUSION

The present study has created an array of the platform to elucidate the factors responsible for changing the minds of rice-based farmers about the agri-entrepreneurship. It evinces shifting towards demand and market-oriented from the production oriented farming. Some major factors such as risk-taking ability, information seeking behaviour and most importantly the economic motivation may help some farmers towards certain transformation. The major part of educated youths of the farm families is looking forward to this type of transformation as more attractive than the old generation. Taking the transformation as a positive note towards self-employment in the farming sector, forecasting the future effect of such transformation on the ecological dynamics in terms of livelihood, biodiversity restoration and ecological resilience can be brought under policy frameworks. It may be suggested to take proper micro level policy measures to provide sufficient knowledge resources and marketing supply chain facility will be beneficial to emerge more agri-entrepreneurs.

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