



Transforming Agriculture and Tea Garden: The Impact on Farm Women Engagement

Monirul Haque^{1*}, S. K. Acharya¹ and Kabita Mondal²

¹Department of Agricultural Extension, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, Pin-741252, India.

²College of Agriculture, Extended Campus of Uttar Banga Krishi Viswavidyalaya, Majhian, Dakshin Dinajpur, West Bengal-733133, India.

Authors' contributions

This work was carried out in collaboration among all authors. Author MH wrote the first draft of the manuscript and managed the literature searches. Author SKA designed and guided the whole research study. Authors MH and KM managed the statistical analyses of the study. All authors read and approved the final manuscript

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ABSTRACT

Aims: To study the relationship between the women farmers' engagement in the transformed tea gardens from conventional farming practices with various socio-economic exogenous variables, their socio-economic condition, economic vulnerability, and empowerment.

Study Design: The locale was selected by the purposive sampling technique and the respondents following such transformation in their farming practices are selected by the random sampling method.

Place and Duration of Study: The study was carried out during the year of 2018-19. The place, three blocks namely Falakata Block, Madarihat Block, and Alipurduar-1 of Alipurduar District of West Bengal of India were selected for the study.

Methodology: In this present study sixty respondents following such transformation in their farming practices have been selected by both purposive and random sampling techniques to study the farm women's engagement in transformed tea gardens as the consequent character in terms of various exogenous variables. Then the numerical data is collected, passed through the data normalization

*Corresponding author: E-mail: monirulhaque441@gmail.com;

process, and then put them into multivariate analysis. The gathered data had been put into multivariate analysis (Statistical Package for the Social Sciences V20.0 (SPSS) of IBM and OPSTAT were used for analyzing the Coefficient of Correlation, Stepwise Regression, and Path Analysis).

Results: The study reveals that the mean change in land under cultivation (x_6), mean change in average garden size (x_7), mean change in total income (x_8) and ratio of pesticides use (x_{10}) variables have been found to exert strong and determining the contribution to this transformational process.

Conclusion: The study had revealed the emergence of small tea gardens help in the empowerment of the women as well as increasing the demand of women labours in the transformed farming sector, which improve the overall status of the tea garden workers.

Keywords: Agricultural transformation; farm women; income; tea women worker; tea garden.

1. INTRODUCTION

Farm women are the most important part of any plantation sector which contributes almost forty-three per cent of the workforce in the developing countries [1]. Women farmers, otherwise termed as the rural women, who are mostly engaging themselves in non paid off-farm, as well as on-farm activities, are the most underestimated workforce in the Indian economy. Different studies have indicated that the female commitment to the overall economy is high all through Asia and the Pacific region [2], especially in terms of labour input into agriculture. Globally more than four hundred million women have interactions in agricultural work, despite the truth that they lack equal land rights and ownership in over ninety countries [3]. Women are engaged in non-mechanized farm works that embrace sowing, winnowing, harvesting, and different forms of labour-intensive methods such as pre and post-harvest processes. Like any other developing countries India also has around eighty per cent of agriculture work undertaken by women comprising thirty-three per cent of the agriculture labour force and forty-eight per cent of the self-employed farmers, however, they own only thirteen per cent of the land [4]. The commitment of women to agriculture and crop production is admirable. But it is difficult to confirm experimentally the offer delivered by women because agriculture is normally an endeavour among family unit individuals and includes a range of resources, inputs, etc. that can not be easily assigned by gender. Along the other side, it is also understandable that women's roles are diversified and location-specific [5]. It also suggests that the women who act as the decision-maker in non-agricultural activities may become disempowered if they are not engaged in agricultural activities [6].

The time-series data also suggested that the nation is seeing a feminization of the farming

workforce as men move quickly to non-rural segments. Day by day the Indian agriculture sector lost it's men farmers who have shifted them from their farming activities to other non-farming activities [4]. That is why a workload of on-farm activities along with the existing off-farm household activities is shifted to women farmers. Whereas for the last quarter of a century, a change in labour participation wherein the part of women in the workforce just as work interest pace of women has been declining [7]. In the present scenario, Indian agriculture also shows evidence of transformation from subsistence type of farming to entrepreneurial farming. The transformation of the agriculture sector due to the lower profitability in the conventional way of farming as well as per capita income of farmers not improving rather than decreasing day by day. But the employment in another sector is also a problematic issue in the Indian context as India has a large population. The entrepreneurial mind farmers are mostly changing their thought to shifting towards plantation crops which gives them better return in terms of relatively low labour.

Tea plantation is the most important and economically sound farming activity which earns enough popularity among the farming community of the northeastern part of India. The ecology of the Northern part of West Bengal i.e. higher rainfall and upland and undulated topography and acidic soil condition is very much favourable for tea plantation [8]. Due to the heavy migration of the rural youth and men farmers to the construction sector, the farming sector of rural India meets a shortage of labours. So the women farmers are very much interested in shifting their farming practices towards plantation crop like tea which have to provide low management and gives higher return. The study also suggests that women tea farmers are more practical in connecting their struggles against economic and cultural domination to the goals of the Fair Trade

movement. They become additional active in community affairs and undertake new business ventures by combating middlemen. In distinction, women plantation workers, despite their previous labour activism, are comparatively incapable of mobilizing the Fair Trade movement to their benefit, despite getting their informal networks. Key reasons for the distinction embrace the various institutional structures of collective bargaining, access to resources (land), existing gender ideologies of work, and gendered community histories of political involvement in previous movements [9]. Women tea garden labourers were enabled by impacting in the family dynamic, interest in social and political exercises. But the empowerment among them is very low because of a lack of economic powers. Without economic power, it is very much difficult to improve their social as well as empowerment status [10]. The major development issues of financial condition alleviation, agrarian reform, industry, international trade and balance of payments intimately involve and affect rural working women (i.e. all poor rural women) means that of fixing the processes and outcomes of decision making are ultimately what ought to be tacit by 'integrating' women in development. Wherever work is concerned, women are already over integrated with development; overburdened with work, they have little to mention within the decision-making process that controls the distribution of work, resources, income, and expenditures [11]. Terai area experienced less level of crisis during the terminations and abandonments over the tea gardens in North Bengal. So the experience of loss of income and job has not been that distinct as in the event of the labourers in Dooars tea estates [12]. In this present study, the relationship among and some exogenous variables with the women farmers' engagement in tea gardens have taken into consideration. The study helps in understanding the social relations of the farm women's' in the newly transformed tea garden along with other causal variables. All these have been done to establish and estimate the pattern; direction and intensity of interaction to ultimately estimate the ecological behaviour of that tea garden set up to ultimately derive and elicited their behavioural traits in the changing climatology, biological and physical setup.

2. METHODOLOGY

A study was carried out with the ex post facto method of research design for the farmers who changed their conventional farming practices

towards Tea Garden in blocks. Three blocks of Alipurduar District of West Bengal named, Falakata, Madarihat, and Alipurduar-1 selected purposively. Thewnty respondents from each block, a total of sixty respondents were selected through the method of random sampling technique. A structured interview schedule was presented for surveying data collection. A focused group discussion was conducted for the collection of baseline data of the villages. Although the study focuses on the Alipurduar district, it is held that the results generated from this study are relevant to many nearby areas of Alipurduar district with a similar climate and socio-economic structures. Appropriate operationalization and measurement of the variables are helped the researcher to land upon the accurate conclusion. Therefore, the selected variables for this study are operationalized and measured in the following manner: (1) Independent variables (x_1 - x_{12}) and (2) Dependent Variable (y). The numerical data had passed through the data normalization process, and then put them into multivariate analysis. Statistical Package for the Social Sciences V20.0 (SPSS) of IBM and online statistical tool OPSTAT [13], were used for analyzing the Coefficient of Correlation, Multiple Regression, Stepwise Regression, and Path Analysis.

2.1 Independent Variables

- Age (x_1): It denotes the chronological age, years, and the months elapsed since the birth of the respondent. It was measured by counting the chronological age.
- Education (x_2): Education status of the respondents has been considered for the study and denoted by the real numbers (i.e. 1, 2, 3...etc.)
- Family education (x_3): The average family education status of the respondents has been considered for the study and denoted by the real numbers (i.e. 1, 2, 3...etc.).
- Cultivated land area (x_4): Total cultivated lands (in terms of Bigha) (farmlands as well as tea garden lands) have been considered for the study.
- Non-cultivated area (x_5): The total area of the lands under homestead, barren, and pond area (in terms of Bigha) has been considered for the study.
- Mean change in land under cultivation (x_6): The changing percentage of the area of conventional farmlands into an area of perennial tea garden lands has for the study.

- Mean change in average garden size (x_7): The changing percentage of the area of perennial tea garden size has been considered for the study.
- Mean change in total income (x_8): The changing percentage of Total Income has been considered for the study.
- Ratio of peripheral plant (x_9): The ratio of the peripheral plant situated in the perennial tea garden and peripheral plant situated in the earlier crop field has been considered for the study.
- Ratio of pesticide use (x_{10}): The ratio of the pesticide used in the perennial tea garden and the earlier crop field has been considered for the study.
- Ratio of fertilizer use (x_{11}): The ratio of the fertilizer used in the perennial tea garden and the earlier crop field has been considered for the study.
- Garden age (x_{12}): The chronological age of the garden from which year the farmer started tea cultivation in his or her farmlands has been considered for the study.

2.2 Dependent Variable

- Ratio of farm women engagement (y): The ratio of the total farm women engagement (Days) in the newly transformed tea garden and the earlier total farm women engagement (Days) generated from the conventional farmlands has been considered for the study.

$$y = \frac{\text{Women labour force engaged in tea garden(T)}}{\text{Farm women engaged in the previous crop}}$$

3. RESULTS AND DISCUSSION

Table 1 presents the coefficient of correlation between ratio of farm women engagement (y) and 12 independent variables (x_1 - x_{12}). It has been found that the following variables viz. mean change in land under cultivation (x_6), mean change in average garden size (x_7), mean change in total income (x_8), ratio of pesticides use (x_{10}) have recorded significant correlation with the ratio of farm women engagement(y). The higher is the mean change in land under cultivation (x_6), as the result suggests, greater has been the engagement of farm women. That means if the farmer converts a relatively larger area of land for preparing it for a tea garden then the engagement of women farmers in the tea garden is gradually high. The higher is the mean change in average garden size (x_7) as the result suggests greater has been the engagement of farm women which has simply reflected the larger garden have a large number of women engagement. In another case, it is evinced that the higher mean change in total income (x_8) and ratio of pesticides use (x_{10}) also involve greater farm women engagement. The income of the farm family shows a significantly positive correlation with farm women's engagement along with the pesticide application. Sharma & Badodiya (2016) [14] in their study also revealed similar findings i.e. education, farming experience, land holdings, annual Income, extension participation, source of information, attitude towards agriculture, and knowledge about agricultural activities found to practice critical bearing on the level of participation of women in agricultural activities.

Table 1. Coefficient of correlation (r): Ratio of farm women engagement(y) vs. 12 independent variables (x_1 - x_{12})

Independent Variables	'r' Value	Remarks
Age (x_1)	-.002	
Education(x_2)	.194	
Family education (x_3)	.129	
Cultivated land area (x_4)	.010	
Non-cultivated area (x_5)	-.126	
Mean change in land under cultivation (x_6)	.552	**
Mean change in average garden size (x_7)	.751	**
Mean change in total income (x_8)	.566	**
Ratio of peripheral plant (x_9)	.104	
Ratio of pesticides use (x_{10})	.486	**
Ratio of fertilizer use (x_{11})	.126	
Garden age (x_{12})	.071	

***Correlation is significant at the 0.01 level*

Table 2. Multiple regression analysis: Ratio of farm women engagement(y) vs. 12 causal variables (x_1 - x_{12})

Sl. No.	Variables	Reg. coef. B	S.E. B	Beta	t value
1	Age (x_1)	-.0277	.0112	-.3839	-2.4636
2	Education(x_2)	-.0118	.0148	-.0786	-.7964
3	Family education (x_3)	.0041	.0249	.0139	.1646
4	Cultivated land area (x_4)	.0348	.0163	.2161	2.1292
5	Non-cultivated area (x_5)	-.1292	.0593	-.2136	-2.1784
6	Mean change in land under cultivation (x_6)	.0011	.0015	.0643	.7523
7	Mean change in average garden size (x_7)	.0069	.0012	.5555	5.7929
8	Mean change in total income (x_8)	.0036	.0012	.2441	2.8533
9	Ratio of peripheral plant (x_9)	.0647	.0231	.2042	2.8045
10	Ratio of pesticides use (x_{10})	.2546	.0620	.3102	4.1090
11	Ratio of fertilizer use (x_{11})	-.0454	.2144	-.0148	-.2117
12	Garden age (x_{12})	.0676	.0304	.3307	2.2226

****R square: 80.10 per cent, **The Standard error of the estimate: .29539**

Table 2 of the regression analysis depicts that, with the combination of 12 causal variables together, 80.10 per cent of the variance in the ratio of farm women engagement (y) has been explained. Among the independent variables, mean change in average garden size (x_7) depicts the highest beta value i.e. 0.5555 explained as the strongest association with the farm women engagement. Although age (x_1), garden age (x_{12}), ratio of pesticides use (x_{10}), mean change in total income (x_8) and ratio of peripheral plant (x_9) also shows significantly higher beta values which indicate stronger the effect of these independent variables in the dependent variable ratio of farm women engagement (y). In this context, it is also notable that four factors, such as living conditions, Workplace Environment, Pay and Conveyance, and Work Timings were the exceptionally problematic elements causing disappointment among the labourers employed in the tea gardens [15].

Table 3 suggests that only four variables retained in the last step and has contributed 74.30 per cent of the total variable explained. Here, mean change in average garden size (x_7), ratio of pesticides use (x_{10}), ratio of peripheral plant (x_9), and mean change in total income (x_8) has got the highest contribution.

The farmers converting their conventional farmlands into tea gardens requires a large number of female workers in the tea garden. If the garden size increase then automatically the requirement of women farmer also increase because of the daily tea leaf plucking operation. Along with the plucking operation, it is also necessary to mention that the tea garden requires a high number of pesticide applications and due to the shortage of the men farmers the women farmers also have to engage for pesticide application, planting perennial crops and their management. From the study, it also showed that when the men farmers are shifting their occupation towards non-farm activities and women farmers take their roles as the result the overall income of the family being changed. In a similar study it is revealed that in the case of agricultural activities of farm women, annual income, social participation, size of landholding, and economic motivation had positive and profoundly critical relation with their participation [16]. Paper also suggests that women's employability is higher in the tea gardens due to their better commitment towards the job, time-bound engagement, lesser absenteeism status, and the over duty engagement is directed towards the higher women engagement [17].

Table 3. Stepwise regression analysis: Ratio of farm women engagement(y) vs. 12 causal variables(x_1 - x_{12})

Sl. No.	Variables	Reg. coef. B	S.E. B	Beta	t value
1	Mean change in average garden size (x_7)	.0076	.0010	.6092	7.5932
2	Ratio of pesticides use (x_{10})	.2499	.0588	.3045	4.2518
3	Ratio of peripheral plant (x_9)	.0698	.0220	.2204	3.1707
4	Mean change in total income (x_8)	.0029	.0012	.2018	2.4466

****R square: 74.30 per cent**

****The Standard error of the estimate: 0.310465**

Table 4. Path analysis: Decomposition of total effects into direct, indirect, and residual effect: Ratio of farm women engagement (y) vs. exogenous variables (x_1 - x_{12})

Sl. no.	Variables	Total effect	Direct effect	Indirect effect	Highest indirect effect
1	Age (x_1)	-.002	-0.385	0.383	0.295 (x_{12})
2	Education(x_2)	.194	-0.077	0.271	0.235 (x_1)
3	Family education (x_3)	.129	0.012	0.117	0.074 (x_1)
4	Cultivated land area (x_4)	.010	0.214	-0.204	-0.156 (x_5)
5	Non-cultivated area (x_5)	-.126	-0.212	0.086	0.157 (x_4)
6	Mean change in land under cultivation (x_6)	.552	0.063	0.489	0.347 (x_7)
7	Mean change in average garden size (x_7)	.751	0.556	0.195	0.127 (x_8)
8	Mean change in total income (x_8)	.566	0.245	0.321	0.288 (x_7)
9	Ratio of peripheral plant (x_9)	.104	0.205	-0.101	-0.068 (x_7)
10	Ratio of pesticides use (x_{10})	.486	0.309	0.177	0.118 (x_7)
11	Ratio of fertilizer use (x_{11})	.126	-0.015	0.141	0.089 (x_7)
12	Garden age (x_{12})	.071	0.333	-0.262	-0.341 (x_1)

**Residual effect: 19.95 per cent

Table 4 presents the Path analysis decomposes the Total effect into the direct, indirect, and residual effect of ratio of farm women engagement (y) vs. 12 exogenous variables (x_1 - x_{12}). The variable mean change in average garden size (x_7) exerts the highest Total effect. The variable mean change in average garden size (x_7) also exerts the highest direct effect and the variable mean change in land under cultivation (x_6), records the highest indirect effect on ratio of farm women engagement (y). The variable mean change in average garden size (x_7) has enrooted the highest indirect effect through as many as five exogenous variables. The path analysis depicts that 19.95 per cent variance in ratio of farm women engagement (y) cannot be explained. So, in Table 4 it has revealed that average garden size (x_7) has been directly impacted by the engagement of farm women. More the garden size means more tendency of women engagement in the tea garden. The variable mean change in land under cultivation (x_6) have also indirectly impacted the women's engagement. In conventional farming where a large number of male farmers are required for various farming activities but in newly transformed tea gardens the requirement of female farmers gradually arises which also supports the FAO's report 2010-11 [1] which reveals that if women farmers had the same access to productive resources as men, they could increase yields by twenty to thirty per cent as well as income and improve the socio-economic condition.

4. CONCLUSION

The women farmers play an important role in the rural economy which directly impacted the growth of the agriculture sector as well as the country's economy. The women's total average employment is considerably higher than men however the female autonomy does not reach full control of their activities and also the decision-making power is preserved by the males. And more importantly women farmers are underprivileged in access to the resources necessary to invest associated expand and improve productivity in an agricultural enterprise. Tea cultivation requires a large number of manual labours and the production of the tea is directly related to the availability of the labour. In this context the rural farmers with the entrepreneurial motive engage themselves in the plantation industry can help in changing the socio-economic development of the rural sector. Which also can attract rural youth and retain them with the agriculture sector. But the awareness about the traditional drudgery methods and improved package of practices are required to improve the tea farming properly to enhance the work output and improve the health of women working in tea estates.

The small tea farmers help in the rural sector by providing adequate income opportunities to the rural people by which a large number of labourer as well as the middlemen who brought the tea leaves from tea growers to the factories have changed their lifestyle. In our study, it was

revealed that the women farmers involved in the newly formed small tea garden help increase the income of the farmers. The abundant availability of women farmers has a greater impact on on-farm sustainability. On the other hand, the rural women who priorly engaged on their on-farm, as well as off-farm activities unpaid, have been getting a wide scope of income generation which helps in their economical improvement as well as the overall societal development. The study of the position of asset household among the tea growers also indicated that the farmers who are engaged as self-employment have a better social status than the other farmers who are worked in others' tea gardens due to them having the availability of the land resource. So, it is very much necessary to provide access to land to the women farmers and allowing decision making helps in their overall socio-economic development. It also suggested that the future study on women empowerment generation index is necessary to the proper interpretation of the fact of the women empowerment in the present field. As well as the selection of variables could have been expanded by incorporating some more variables that would have been resilient in domain interactions and the aspect of social metabolism that theoretically designed the flow of energy within and between the system has not been empirically studied.

The newly emerged individual tea growers may act as agri-entrepreneurship of these localities and provide proper access to the resources to the farm women. It is recommended that the proper policy implementation for the benefit of the women community and the involvement of the local self-help groups may also increase the productivity of the women agri-entrepreneurs of this field. Any study on socio-ecological transformation has got melliflence of impact having multiple sets and colours. Thus the study itself suggests its multi replication for the stakeholders of the different ecosystems.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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