

Determinants of small rubber growers' adoption behaviour in Dhalai district of Tripura

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ABSTRACT

Rubber farming has been the main stay of continuous income generation of poor tribal jhumias' of hilly state in Tripura over the several years since it was introduced. Owing to suitability of climatic condition, the state has emerged as one of the largest rubber producer in the country along with changes in the adoption of cultivation technology. The present study was undertaken in three villages of Manu block, Dhalai district, Tripura to ascertain some associated variables of the rubber growers' adoption behavior. The results indicate that the socio-economic variables like age, education, homestead land, own land and area under rubber cultivation had become the predominant factors in adopting the recommended technology packages among the respondents.

Keywords: Adoption behavior, rubber farming, shifting cultivation

Rubber is one of the successful histories about a foreign tree, has been introduced in Tripura state. Being a highly profitable investment, rubber can be seen as having considerable potential for poor upland farmers in line with government policy for stabilizing shifting cultivation and supporting new livelihood options for poverty reduction (Manivong and Cramb 2008). In less than fifty years after its introduction, the latex from rubber trees became an important economic source not only for local governments but for a large number of small producers who discovered in rubber an important source of continuous cash flows. Nowadays, rubber is vital for the welfare of hundreds of small farmers around the region who earlier were depending on shifting cultivation for their livelihood. In view of rubber's potential to rehabilitate degraded forests, to settle tribal shifting cultivators, and to generate employment for the rural poor, the state government created the Tripura Forest Development & Plantation Corporation Limited (TFDPC Ltd) in 1976 for raising rubber plantations in the state (Bahuguna, 2006). Rubber has now attained the status of the most important plantation crop in Tripura not merely because of its commercial success, but more so due to its innovative application for economic rehabilitation of shifting cultivators, which delivered generally a degree of success in a manner hitherto not experienced in any rehabilitation package on un-arable uplands. Tripura is now second largest rubber growing state in India with 33.7 per cent of the potential area under rubber. Keeping in view, government agency has been imparting training time to time to many farmers on cultivation technology and

practices which received well responses from sizeable section of farmers. In this view, the study was designed with the specific objectives to identify and determine the independent variables or characteristics affecting the behavior of technology adoption of cultivation practices and to study the relationships and interdependency between personal and socio-economic characteristic with adoption behavior of rubber growers'.

MATERIALS AND METHODS

The area of investigation of this study is situated in the state of Tripura located in the northeastern part of India. The purposive as well as simple random sampling techniques were adopted for the study. It may be termed as multistage random sampling procedure. The districts, blocks and villages were purposively selected for the study. The Dhalai district and the block Manu were considered. Under the Manu block Moinama, Lambabil and Kukilmani villages were selected. From these villages 77 respondents were selected by using random sampling method.

The data were collected using pretested structured schedule by personal interview method. Age (X_1), Education (X_2), Family size (X_3), Farm mechanization (X_4), Cropping intensity (X_5), Homestead (X_6), Own land (X_7), Area under rubber (X_8), Annual income-farm (X_9), Income from rubber (X_{10}), Annual-income off farm (X_{11}), Economic status (X_{12}), Material possession (X_{13}), Scientific orientation (X_{14}), Orientation towards adoption (X_{15}), Orientation towards discontinuance (X_{16}), Orientation towards rejection (X_{17}), Communication and Utilization of source of information (X_{18}) were

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selected as independent variables for the purpose of the study. Dependent variable Adoption index (Y) has been measured as level of adoption divided by recommended level of adoption in term of percentage. Statistical tools like correlation analysis; regression analysis and path analysis have been used in the present study.

RESULTS AND DISCUSSION

Co-efficient of Correlation analysis

Table-1 reveals that the variable Education(X₂) of the respondents has been found positive and significant correlation with extent of adoption level. This table also reveals that some variables namely Age (X₁), Homestead land (X₆) and Area under rubber (X₈) have shown significant but, negatively correlation with adoption of scientific rubber cultivation practices. Similar findings were also reported by Nanda *et al.* (2011) in adoption of scientific cultivation

of guava. Education monitors behavioral disposition and adoption behavior. Any kind of attitude is the resultant of directional behavioral pursuits, so it has been inclined towards positive attitude for adoption of available technology for rubber plantation. Again age is basically a disposition of biological chronology and psychological maturity and the young respondents have shown the propensity to adopt the new and recommended technology. It is also unique to observe that the farmer having smaller homestead land is more prone towards adoption of rubber plantation. So, plantation technology has bestowed a clear dent for the farmer having smaller homestead land. The farmer having smaller size of holding to run rubber enterprise are more dent on better adoption of plantation technology. Smaller plantations mean high intensity management and are more dynamic display of modernizing enterprise through adoption of technology.

Table 1: Co-efficient of Correlation correlation analysis: adoption index (Y) vs. 18 independent variables

| Variables | r value |
|---|---------|
| 1. Age (X ₁) | -0.261* |
| 2. Education (X ₂) | 0.237* |
| 3. Family size (X ₃) | -0.022 |
| 4. Farm mechanization (X ₄) | 0.044 |
| 5. Cropping Intensity (X ₅) | 0.128 |
| 6. Homestead land (X ₆) | -0.227* |
| 7. Own land (X ₇) | -0.146 |
| 8. Area under Rubber (X ₈) | -0.303* |
| 9. Annual Income (X ₉) | -0.137 |
| 10. Income from Rubber (X ₁₀) | -0.211 |
| 11. Off-farm income (X ₁₁) | 0.002 |
| 12. Economic status (X ₁₂) | -0.081 |
| 13. Material possession (X ₁₃) | -0.073 |
| 14. Scientific Orientation (X ₁₄) | 0.035 |
| 15. Value towards adoption (X ₁₅) | -0.020 |
| 16. Value towards discontinuance (X ₁₆) | 0.127 |
| 17. Value towards rejection (X ₁₇) | -0.025 |
| 18. Mass media exposure (X ₁₈) | 0.188 |

Note: * Significant at 5% level of significance

Multiple regression analysis

Table-2 reveals that the variable Area under rubber(X₈) has been found significantly negative correlation which indicates consequent variable adoption index is characterized by the size of the area under rubber plantation. This means smaller size of

rubber plantation holdings is more prone to adopt the technology available. This reason being smaller size plantations are easy to manage and intensify the farm operations. R² value being 0.308, it is concluded that with the combination of all these 18 causal variables, 30.08 per cent variance in adoption has been explained.

Step down regression analysis

Tables-3 presenting the step-down regression analysis has isolated two critical causal variables namely Area under rubber (X_8) and Family size (X_3) as to have substantive impact on adoption process of rubber cultivation technologies. The two variables together have explained 24.7 per cent ($0.092+0.155$) of variance embedded with consequent variable.

Path analysis

Table 4, presents the path analysis for decomposing the total effect(r) of the antecedent

variables into direct, indirect and residual effect on the consequent variable, Adoption index (Y_1). It has been found that the variable area under rubber (X_8) has exerted the highest direct effect as well as highest total effect on adoption of readily available cultivation technology. Own land(X_7) has recorded highest level of indirect in characterizing adoption index. The residual effect being 0.6919, it is concluded that even with combination of all these 18 variables, 69.19 per cent of the variance on the consequent variable, adoption index could not be explained.

Table 2: Multiple regression analysis: adoption index (Y) vs. 18 independent variables

| Variables | β -Value | Regression Co-efficient | t-Value |
|---|----------------|-------------------------|----------------|
| 1. Age (x_1) | -0.214 | -0.279 | -1.200 |
| 2. Education(X_2) | 0.110 | 1.412 | 0.615 |
| 3. Family size (X_3) | -0.283 | -2.737 | -1.586 |
| 4. Farm mechanization (X_4) | 0.022 | 0.057 | 0.166 |
| 5. Cropping Intensity (X_5) | -0.156 | -0.078 | -1.135 |
| 6. Homestead land (X_6) | -0.122 | -6.333 | -0.904 |
| 7. Own land (X_7) | 0.242 | 3.318 | 1.083 |
| 8. Area under Rubber (X_8) | -0.629 | -12.110 | -2.386* |
| 9. Annual Income (X_9) | 0.155 | 0.000 | 0.928 |
| 10. Income from Rubber (X_{10}) | -0.189 | 0.000 | -0.932 |
| 11. Off-farm income (X_{11}) | 0.008 | 0.420 | 0.060 |
| 12. Economic status (X_{12}) | 0.128 | 15.735 | 0.909 |
| 13. Material possession (X_{13}) | -0.025 | 0.000 | -0.174 |
| 14. Scientific Orientation (X_{14}) | -0.021 | -0.613 | -0.158 |
| 15. Value towards adoption (X_{15}) | -0.092 | -2.632 | -0.716 |
| 16. Value towards discontinuance (X_{16}) | 0.213 | 6.498 | 1.566 |
| 17. Value towards rejection(X_{17}) | 0.020 | 0.838 | 0.153 |
| 18. Mass media exposure(X_{18}) | 0.100 | 5.429 | 0.740 |

Note: $R^2=0.308$, adjusted R square=0.094, * denotes significant at 5% level

Table 3: Step down Regression analysis: adoption index (Y) vs. 18 independent variables

| Predictors | B | S.E | Beta | t | Rsquare | AdjustedR | SE of the estimate |
|-----------------------------|--------|-------|--------|-----------------|---------|-----------|--------------------|
| Area under rubber (X_8) | -9.436 | 2.562 | -0.490 | -3.682** | 0.092 | 0.079 | 15.489 |
| Family size(X_3) | -3.046 | 1.290 | -0.315 | -2.362* | 0.155 | 0.132 | 15.036 |

Note: *, ** significant at 5% and 1% level of significance, respectively

Table 4: Path analysis: Adoption index (Y₁) Vs 18 independent variables (Residual effect- 0.691)

| Variables | Direct effect | Indirect effect | Total effect(r) | Substantial indirect effect | | |
|---|---------------|-----------------|-----------------|-----------------------------|--------------------------|---------------------------|
| | | | | I | II | III |
| 1. Age(X ₁) | -0.21 | -0.05 | -0.26 | -0.072 (x ₂) | 0.043 (x ₇) | -0.042 (x ₈) |
| 2. Education(X ₂) | 0.11 | 0.13 | 0.24 | 0.139 (x ₁) | -0.035 (x ₉) | -0.034 (x ₅) |
| 3. Family size(X ₃) | -0.28 | 0.26 | -0.02 | 0.376 (x ₈) | -0.132 (x ₇) | 0.117 (x ₁₀) |
| 4. Farm mechanization(X ₄) | 0.02 | 0.02 | 0.04 | 0.049 (x ₁) | -0.038 (x ₈) | 0.028 (x ₁₆) |
| 5. Cropping Intensity (X ₅) | -0.16 | 0.28 | 0.13 | 0.093 (x ₈) | 0.048 (x ₃) | 0.033 (x ₇) |
| 6. Homestead land (X ₆) | -0.12 | -0.11 | -0.23 | -0.059 (x ₁₆) | -0.048 (x ₃) | 0.035 (x ₅) |
| 7. Own land(X ₇) | 0.24 | -0.39 | -0.15 | -0.480 (x ₈) | 0.155 (x ₃) | -0.099 (x ₁₀) |
| 8. Area under Rubber (X ₈) | -0.63 | 0.33 | -0.30 | 0.185 (x ₇) | 0.169 (x ₃) | -0.141 (x ₁₀) |
| 9. Annual Income (X ₉) | 0.16 | -0.29 | -0.14 | -0.347 (x ₈) | 0.113 (x ₃) | -0.111 (x ₁₀) |
| 10. Income from Rubber (X ₁₀) | -0.19 | -0.02 | -0.21 | -0.472 (x ₈) | 0.176 (x ₃) | 0.128 (x ₇) |
| 11. Off-farm income (X ₁₁) | 0.01 | -0.01 | 0.00 | -0.136 (x ₈) | 0.082 (x ₃) | -0.034 (x ₁₀) |
| 12. Economic status (X ₁₂) | 0.13 | -0.21 | -0.08 | -0.312 (x ₈) | 0.110 (x ₇) | 0.095 (x ₃) |
| 13. Material possession (X ₁₃) | -0.03 | -0.05 | -0.07 | -0.243 (x ₈) | 0.063 (x ₇) | -0.055 (x ₁₀) |
| 14. Scientific Orientation (X ₁₄) | -0.02 | 0.06 | 0.04 | -0.056 (x ₃) | 0.043 (x ₁) | 0.036 (x ₂) |
| 15. Value towards adoption (X ₁₅) | -0.09 | 0.07 | -0.02 | 0.045 (x ₈) | -0.040 (x ₉) | -0.039 (x ₃) |
| 16. Value towards discontinuance (X ₁₆) | 0.21 | -0.09 | 0.13 | 0.083 (x ₈) | -0.046 (x ₃) | -0.040 (x ₇) |
| 17. Value towards rejection(X ₁₇) | 0.02 | -0.05 | -0.03 | 0.085 (x ₈) | -0.039 (x ₁) | -0.039 (x ₉) |
| 18. Mass media exposure(X ₁₈) | 0.10 | 0.09 | 0.19 | 0.048 (x ₈) | 0.044 (x ₁) | 0.025 (x ₁₀) |

The major outcome of the study reveals that area under rubber cultivation is found to be the major determining factor in adopting the cultivation technologies and small area holders farmer are more prone towards adoption than the famer holding larger area. Among personal and socio-economic variables age, education, homestead land are also found to be significant. Thus, it can be suggested that those significant variables under rubber farming systems should get more emphasis and care through concerted efforts while formulating different development strategies and programmes for different categories of farmers.

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