Technology Socialization Process of Pulse Enterprise: The Structural and Functional Analysis

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Authors’ contributions
This work was carried out in collaboration among all authors. Author DP wrote the first draft of the manuscript, collected data and done statistical analysis. Authors AG and KM helped in collection of data and preparation of manuscript. Authors AB and SKA helped in interpretation and supervised the work. All authors read and approved the final manuscript.

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ABSTRACT

Technology socialization process has operationally been defined as the interactive summation of all possible responses to a technology application process in terms of adoption, rejection, discontinuance and reinvention. Here, this interactive summation is measured against a set of standard practices applied in pulse enterprises and the level of socialization as measured against a “recommended technology”. The following specific objectives are set to intervene the present study. Those are, to generate basic information on socialization of pulse crop in the study area to identify and standardize the variables, dependent and independent, impacting on both socialization of pulse crop in the study area, to elucidate inter and intra level interaction between dependent variables i.e. Socialization with those of selected socio economic and ecological variables, to delineate the micro level policy based on the empirical result on effective socialization process. The study has been carried out in two developed block namely Chakdah and Haringhata of Nadia District in West Bengal. The multistage purposive and random sample techniques were the key to
contrast sampling design in the present study. The following variables, gross return, area under pulse cultivation, training received, yield, farmer’s attitude towards pulse cultivation have been found generating significant functional impacts on the predicted character, technology Socialization. The statistical tools like mean, standard deviation and coefficient of variation, coefficient of variation, coefficient of correlation, multiple regression, step down multiple regression and path analysis. The study also responded to the inquiry as to where and how the classical crop production process can be replaced with pulse crop and whereas this replacement will be much rewarding and beneficiary to the common farmer. The determinants like gross return, area under pulse crop, training received, productivity of pulse crop and farmer’s attitude are decisively characterizing the socialization process of pulse crop.

Keywords: Adoption; discontinuance; pulse enterprise; rejection; technology socialization process.

1. INTRODUCTION

Pulse provides the green source of protein to millions of Indian and beyond. In India pulse crop have been described as a “poor man’s meat and rich man’s vegetable”. It’s a rare type of vegetative protein which retain lysine one of the most important amino acid. As against animal protein, it’s the cheaper source of vegetative protein as well. As a crop, it needs less water and nutrient, less cost of investment as well. Indian agriculture cannot fulfill the total pulse requirement, hence, a huge expenditure incurred over pulse import and export [1].

In India, major pulses like chickpea, lentil and pigeon pea account for 39, 10 and 21% of the total pulse production in the country [2]. The changing climatic conditions have a major impact on rainfed crops including pulses [3]. Pulses are reported to be particularly sensitive to heat stress at the bloom stage; only a few days' exposure of high temperature (30-35°C) can cause heavy yield losses through flower drop or pod damage [4].

Introducing pulse crops that simultaneously adapt to climate change and contribute to mitigating its effects can be key to increasing resilience to climate change in farming [5]. Pulses themselves are, however, very sensitive to torrential rain, especially in the early vegetative stage and at flowering and a high quantity of rainfall can cause disease infestation in crops [6].

The socialization model, here in this, has been christened as an alternative social process to purvey the transfer process to purvey the transfer process in a multi way channel and to a multidimensional projection. In the same study, the adoption, discontinuance, rejection and reinvention have been conceived as a socio-psychological polymer against a single stimulus i.e. technology exposure [7]. When society is getting increasingly restless owing to a series of non-compliances, conflict, comprehensive direction, mutual denial, disagreement between what we call the imposed knowledge vs. inherent knowledge, exotic knowledge or exotic idea vs. in- situ idea; protected need vs felt need and so on, the ‘social entropy or social disorder’ is expected to simmer. Before adding new skill or useful technical knowledge, we need to study residual disorder, already created by malfunction of previous technology, and, at the same time, before adding new capacity to community capability, we need to pump out the incapability’s already created by sneak of the previous technology [8]. That is why, the technology socialization models an inevitable development over the transfer of technology concept, to critically analyse the sub process and sub consequence like adoption, discontinuance, rejection, and reinvention with a steamed analogy that every human mind is a complex disposition of didactic behaviour, forming what you call diodes of adoption-rejection, adoption-discontinuance, invention- reinvention, creation-culmination [9].

Technology socialization process has operationally been defined as the interactive summation of all possible feedback to a technology application process in terms of adoption, rejection, discontinuance and reinvention [10]. Here, this interactive summation is measured against a set of standard practices applied in pulse enterprises and the level of socialization ass measured against a “standard technology”. The technology and the inputs are used as a material account of means to estimate this complex social and qualitative outcome i.e. Technology Socialization. In the light of the above discussion the researcher had delineated the following specific objectives for the present
study. The following specific objectives are set to intervene the present study. Those are, to generate basic information on socialization of pulse crop in the study area to identify and standardize the variables, dependent and independent, impacting on both socialization of pulse crop in the study area, to elucidate inter and intra level interaction between dependent variables i.e. Socialization with those of selected socio economic and ecological variables, to delineate the micro level policy based on the empirical result on effective socialization process.

2. MATERIALS AND METHODS

The study has been carried out in two developed block namely Chakdah and Harinaghta of Nadia District in West Bengal. Both the district and block are selected purposively due unique nature of the locations terms of technology socialization with a view to the consequence of innovation decision process viz adoption, rejection and discontinuance and market behaviour of pulse enterprise considered for present study. The two villages out of twenty-seven gram panchayats were purposively selected for the present study. An exhaustive list of respondents prepared with help of farmers, shop owner and panchayat officials. From the list one hundred fifty respondents were randomly selected for study. The multistage purposive and random sample techniques were the key to contrast sampling design in the present study. A pilot study was conduct in the selected villages before constructing the data devices to acquaint with the local in terms of the demography and the level of technology socialization and market behaviour of pulse enterprises. The variable socialization of pulse enterprise was considered as the dependent or predicted or consequent variable have been measured in term of extent of adoption, extent of rejection, extent of discontinuance using the scale developed by S.N. Chattopadhyay(1993) which was slightly modified for the requirement of the study. The twenty-seven independent or casual or predictor or antecedent variables selected and operationalized and measured according to their concept and relationship with the dependent variables with the help of exact scales developed by the previous social scientist or by slightly modifying the developed scales for the requirement of the study. The final primary data were collected with the help of structured interview schedule by following the personal interview method. The secondary data were collected by following case study method to throw the light into the intrinsic character of the consequences of the innovation decision process and to establish the conceptual framework of the present study on strong logistic.

3. RESULTS AND DISCUSSION

3.1 Correlation Coefficient of Socialization of Pulse Enterprise ($Y_1$) with 27 Independent Variables

Fig. 1 presents the correlation coefficient of consequent variable, socialization of pulse enterprise ($y$) with 27 independent variables. It has been found that variables viz. family size ($X_6$), area under pulse cultivation (bigha) ($X_3$), farmer’s attitude towards pulse crop cultivation ($X_{13}$), knowledge level of farmer towards cultivation of pulse crop ($X_{10}$), gross return (rs/ bigha) ($X_{23}$), training received ($X_{27}$) have recorded the positive and productivity or yield (kg/bigha) ($X_{24}$) has recorded significant but negative correlation with socialization of pulse enterprise. Result evinces that the socialization of pulse enterprise ($Y_1$) has scaled up for those having higher size of holding and these also been elicited by the farmer having proper attitude and adequate knowledge for the cultivation viz for socialization of pulse enterprise ($Y_1$).Socialization of pulse enterprise ($Y_1$) also has helped the scaling up of gross return became of training received and exposure met subsequently however its interestingly to know that pulse productivity has been better for those having less of exposure to formal socialization programme organization formal institution as well as organization.

3.2 Multiple Regression Analysis of Socialization of Pulse Enterprise ($Y_1$) with 27 Causal Variables (Model Summary)

Table 2 Presents the multiple regression analysis which reflects the functional efficacy of the correlation through ‘beta’ value and respective ‘t’ values of the casual variables on the consequent variables i.e. socialization of pulse enterprise ($Y_1$).

Table 2 presents the $R^2$ value 0.787 being, it’s is to conclude that even combination of all 27 variables so far, 78.7 % of variability embedded with the consequent variable has been explained.
3.3 Stepwise Regression Analysis of Socialization of Pulse Enterprise ($Y_1$) with 27 Causal Variables

Fig. 2 presents the step down multiple regression. It has been found that the variables gross return (Rs/Bigha) ($X_{25}$), area under pulse cultivation (Bigha)($X_5$), training Received ($X_{27}$), productivity or yield (Kg/Bigha) ($X_{24}$), farmer’s attitude towards pulse crop cultivation ($X_{14}$) have been retained after eliminating the trivial in the preceding step. These variables together have explained 76.8 per cent of total ‘R’ values of 78.7 per cent. So 5 variables of the total 27 variables merit highest importance in socialization of pulse enterprise($Y_1$). The variables retained in the last stage in stepwise regression analysis does present an operational constellation of 4 dominant variables working together and interacting articulately it can characterize both the level and direction of disillusionment.

So, those few variables can go immensely important in making the farmers relinquished of disillusionment and thus have incubated an important strategic implementation for research locale and similes.

3.4 Path Analysis of Comprehensive Socialization of Pulse Enterprise ($Y_1$) with 27 Causal Variables

Table 3 presents the path analysis, by decomposing the total effect (r) of antecedent variables into direct indirect effect and residual effect. Path analysis has been administered to get direction and network of influence of antecedent variables on consequent variable. From the table, it’s is clear that variable, gross return (Rs/ Bigha) ($X_{25}$) has exerted highest direct effect on socialization of pulse enterprise ($Y_1$) followed by area under pulse cultivation (Bigha) ($X_5$) and productivity or yield (kg/Bigha) ($X_{24}$). In case of indirect effect on socialization of pulse enterprise ($Y_1$),area under pulse cultivation ($X_{25}$) and followed by gross return (Rs/ Bigha) ($X_{20}$) and farmer’s attitude towards pulse crop cultivation ($X_{14}$). It is discernible from the table the highest number of variables (21) has routed their substantial indirect effect through the variable, area under pulse cultivation (Bigha) ($X_5$). So, it could be inferred that these variables have got both substantive and associating properties to characterize the socialization of pulse enterprise ($Y_1$). Land resource as endowment is still the most important determinant for socialization for agriculture technology and the number of pulse crop. So better responses have been generated by those having higher land size while these didactic relation needs a support from attitude input from responds towards socialization of pulse enterprise ($Y_1$). The residual effect being 0.2124, it is to conclude that 21.24 per cent of variation in this interaction could not be explained.

![Fig. 1. Model of correlation coefficient of socialization of pulse enterprise ($y_1$) with 27 independent variables](image-url)
Table 1. Coefficients of multiple regression analysis of socialization of pulse enterprise ($Y_1$) with 27 causal variables

| Variables                                      | Unstandardized coefficients | Standardized coefficients | T       | Sig.  |
|------------------------------------------------|----------------------------|---------------------------|---------|-------|
|                                                 | B        | Std. Error | Beta     |       |       |
| 1. Age ($X_1$)                                 | -0.113   | 0.405      | -0.013   | -0.278 | 0.781 |
| 2. Education ($X_2$)                           | 0.634    | 1.714      | 0.018    | 0.370  | 0.712 |
| 3. Family size ($X_3$)                         | -0.896   | 1.013      | -0.044   | -0.885 | 0.378 |
| 4. Family education ($X_4$)                    | 0.572    | 2.023      | 0.013    | 0.283  | 0.778 |
| 5. Area under pulse cultivation (Bigha) ($X_5$)| 41.217   | 12.837     | 0.359    | 3.211  | 0.002 |
| 6. Farm size and technology adoption (Bigha) ($X_6$)| -0.250 | 1.086      | -0.015   | -0.230 | 0.818 |
| 7. No of crop diversity ($X_7$)                | -10.006  | 11.067     | -0.056   | -0.904 | 0.368 |
| 8. Income (Rs /per capita/annum) ($X_8$)       | 6.994-005| 0.000      | 0.017    | 0.364  | 0.717 |
| 9. Risk Orientation ($X_9$)                    | 1.974    | 3.335      | 0.027    | 0.592  | 0.555 |
| 10. Scientific Orientation ($X_{10}$)          | -4.508   | 3.412      | -0.063   | -1.321 | 0.189 |
| 11. Planning orientation ($X_{11}$)             | 2.325    | 3.388      | 0.032    | 0.686  | 0.494 |
| 12. Production orientation ($X_{12}$)          | -1.113   | 3.206      | -0.015   | -0.347 | 0.729 |
| 13. Market Orientation ($X_{13}$)              | 4.945    | 4.209      | 0.055    | 1.175  | 0.242 |
| 14. Farmers attitude towards Pulse crop cultivation ($X_{14}$) | 10.401 | 4.638      | 0.116    | 2.242  | 0.027 |
| 15. Knowledge level of farmer towards cultivation of pulse crop ($X_{15}$) | 3.902 | 2.039      | 0.100    | 1.913  | 0.058 |
| 16. Knowledge about insecticides ($X_{16}$)    | -2.325   | 18.476     | -0.006   | -0.126 | 0.900 |
| 17. Knowledge about fungicide ($X_{17}$)        | -17.517  | 19.005     | -0.042   | -0.922 | 0.358 |
| 18. Knowledge about weed control ($X_{18}$)     | 5.824    | 11.840     | 0.024    | 0.492  | 0.624 |
| 19. Knowledge about IPM practice ($X_{19}$)     | -13.185  | 27.920     | -0.021   | -0.472 | 0.638 |
| 20. Farmers attitude towards IPM programme ($X_{20}$) | 0.392 | 5.207      | 0.003    | 0.075  | 0.940 |
| 21. Attitude towards adoption ($X_{21}$)        | 0.651    | 4.633      | 0.006    | 0.141  | 0.888 |
| 22. Attitude towards discontinuous ($X_{22}$)   | -1.762   | 3.987      | -0.021   | -0.442 | 0.659 |
| 23. Attitude towards rejection ($X_{23}$)       | 3.667    | 7.465      | 0.022    | 0.491  | 0.624 |
| 24. Productivity or yield (kg/Bigha) ($X_{24}$) | -0.229   | 0.086      | -0.128   | -2.662 | 0.009 |
| 25. Gross return (Rs/ Bigha) ($X_{25}$)         | 0.005    | 0.001      | 0.395    | 3.650  | 0.000 |
| 26. Utilization of cosmopolite sources of information($X_{26}$) | 2.240 | 17.823     | 0.006    | .126   | 0.900 |
| 27. Training received ($X_{27}$)                | 3.577    | 1.397      | 0.118    | 2.561  | 0.012 |
Table 2. Multiple regression analysis of socialization of pulse enterprise (Y1) with 27 causal variables (model summary)

| Model | R     | R square | Adjusted R square | Std. error of the estimate | R square change | F change | df1 | df2 | Sig. F change |
|-------|-------|----------|-------------------|---------------------------|----------------|----------|-----|-----|--------------|
| 1     | 0.887 | 0.787    | 0.740             | 43.730079                 | 0.787          | 16.741   | 27  | 122 | 0.000        |

Table 3. Path analysis of comprehensive Socialization of pulse enterprise (Y1) with 27 causal variables

| Variables                              | Total effect | Direct effect | Indirect effect | | Substantial effect |
|----------------------------------------|--------------|---------------|-----------------|---|-------------------|
| 1. Age (X1)                            | -0.0433      | -0.012        | -0.0310         | | -0.0238 -0.0133 0.0098 |
|                                        |              |               |                 | X5 X14 X24 | X5 X14 X24 |
| 2. Education (X2)                      | 0.0312       | 0.0178        | 0.0133          | | 0.0149 -0.0116 -0.0105 |
|                                        |              |               |                 | X25 X15 X5 | X25 X15 X5 |
| 3. Family size (X3)                    | 0.2380       | -0.0433       | 0.2813          | | 0.1299 0.1053 0.0144 |
|                                        |              |               |                 | X5 X25 X27 | X5 X25 X27 |
| 4. Family education (X4)               | -0.0231      | 0.0138        | -0.0369         | | -0.0159 -0.0145 -0.0125 |
|                                        |              |               |                 | X5 X25 X15 | X5 X25 X15 |
| 5. Area under pulse cultivation (Bigha) (X5) | 0.8300       | 0.3609 (II)   | 0.4691 (I)     | | 0.3549 0.0564 0.0352 |
|                                        |              |               |                 | X25 X14 X27 | X25 X14 X27 |
| 6. Farm size and technology adoption (Bigha) (X6) | 0.0488       | -0.0141       | 0.0629          | | 0.0381 0.0224 -0.0083 |
|                                        |              |               |                 | X7 X5 X24 | X7 X5 X24 |
| 7. No of crop diversity (X7)           | -0.0935      | -0.0553       | -0.0382         | | -0.0318 -0.0236 -0.0130 |
|                                        |              |               |                 | X5 X25 X15 | X5 X25 X15 |
| 8. Income (Rs /per capita/annum) (X8)  | -0.0415      | 0.0162        | -0.0578         | | -0.0336 -0.0130 -0.0077 |
|                                        |              |               |                 | X24 X25 X3 | X24 X25 X3 |
| 9. Risk Orientation (X9)               | -0.0642      | 0.0272        | -0.0914         | | -0.0444 -0.0437 -0.0149 |
|                                        |              |               |                 | X25 X5 X15 | X25 X5 X15 |
| 10. Scientific Orientation (X10)       | 0.0351       | -0.0629       | 0.0980          | | 0.0285 0.0228 0.0223 |
|                                        |              |               |                 | X5 X25 X15 | X5 X25 X15 |
| 11. Planning orientation (X11)         | 0.0159       | 0.0319        | -0.0160         | | -0.0198 0.0152 -0.0077 |
|                                        |              |               |                 | X24 X27 X10 | X24 X27 X10 |
| 12. Production orientation (X12)       | -0.0141      | -0.0157       | 0.0016          | | -0.0152 -0.0097 0.0070 |
|                                        |              |               |                 | X5 X15 X24 | X5 X15 X24 |
| Variables                                                                 | Total effect | Direct effect | Indirect effect | Substantial effect |
|--------------------------------------------------------------------------|--------------|---------------|-----------------|--------------------|
| 13. Market Orientation (X_{13})                                           | 0.0901       | 0.0544        | 0.0357          | X5 X27 X25         |
| 14. Farmers attitude towards Pulse crop cultivation (X_{14})              | 0.5230       | 0.1163        | 0.4067 (III)    | X25 X5 X15         |
| 15. Knowledge level of farmer towards cultivation of pulse crop (X_{15})  | 0.3910       | 0.0998        | 0.2912          | X25 X5 X14         |
| 16. Knowledge about insecticide (X_{16})                                  | -0.0078      | -0.0059       | -0.0018         | X25 X15 X24        |
| 17. Knowledge about fungicide (X_{17})                                    | 0.0657       | -0.0414       | 0.1071          | X25 X5 X15         |
| 18. Knowledge about weed control (X_{18})                                 | 0.0147       | 0.0232        | -0.0085         | X24 X15 X25        |
| 19. Knowledge about IPM practice (X_{19})                                 | 0.0504       | -0.0211       | 0.0716          | X5 X25 X24         |
| 20. Farmers attitude towards IPM programme (X_{20})                       | 0.0560       | 0.0037        | 0.0523          | X25 X5 X14         |
| 21. Attitude towards adoption (X_{21})                                    | 0.0486       | 0.0066        | 0.0420          | X24 X15 X13        |
| 22. Attitude towards discontinuous (X_{22})                               | 0.0839       | -0.0205       | 0.1044          | X25 X5 X14         |
| 23. Attitude towards rejection (X_{23})                                   | -0.0276      | 0.0221        | -0.0497         | X5 X25 X10         |
| 24. Productivity or yield (kg/Bigha) (X_{24})                             | -0.2020      | -0.1275 (III) | -0.0745         | X25 X5 X15         |
| 25. Gross return (Rs/ Bigha) (X_{25})                                     | 0.8340       | 0.3930 (I)    | 0.4410 (II)     | X5 X14 X27         |
| 26. Utilization/Information/Cosmopolite (X_{26})                          | -0.0653      | 0.0053        | -0.0706         | X15 X5 X13         |
| 27. Training received (X_{27})                                            | 0.3780       | 0.1170        | 0.2610          | X25 X5 X14         |

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4. CONCLUSION

This is both the output and outcome of researches with both empirical and social application, vindicated by research and logically nurtured by conclusion; it goes on prescribing to make a pragmatic application of research output, either to solve a problem turning to prospect. Every curve of recommendation means to a logical action, realistic approach and meaningful intervention.

The following recommendations, out of the research experience and analyzed information, could now be made.

We need comprehensive outlook on technology socialization process. A sceptic study on any of these consequences; adoption, rejection, discontinuances etc. may bring only a cryptic of technology transfer. So, a concurrent study on adoption-rejection-discontinuance-reinvention can only describe the technology socialization process and in totally;

Every KVK/ Extension Department/ Research organization etc. should collect rejection and discontinuance data rather than harping on adoption process and demonstrating it in an impostor manner;

High cropping intensity does bring not only sequels of adoption but also series of rejection. When one is rejected, the alternatives find an opportunity to be adopted, when one is adopted, then one needs to be culminated make room for newer one. So, a ‘redox’ mode of interaction (rejection) can standardize to estimate plasma stage of socialization i.e. a mix of adoption-rejection in an interchangeable manner;

Socialization of technology involves cost, time and resources. So, every socialization process needs to socially, economically and chronologically audited and catalogued, if possible crop wise and input wise;

Every community presents a unique culture echelon which response uniquely to any technology socialization process. So, an integration of social and psychological inputs needs to be rendered measureable through an OVI, objectively verifiable indicator, against a structural formation socialization;

In technology transfer process, if it really is attempted, then a second thought needs to be elicited. Ask one to get the best answer – a technology is a character encapsulated with ideas and thought process and certainly does not represent some Kg’s of fertilizer wielding so called transfer of technology (TOT).

CONSENT

As per international standard or university standard guideline participant consent has been collected and preserved by the authors.
COMPETING INTERESTS

Authors have declared that no competing interests exist.

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