

## **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

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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 t [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 multi-dimensional 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 Haringhata 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 ( $X_3$ ), area under pulse cultivation (bigha) ( $X_5$ ), farmer's attitude towards pulse crop cultivation ( $X_{14}$ ), knowledge level of farmer towards cultivation of pulse crop ( $X_{15}$ ), gross return (rs/bigha) ( $X_{25}$ ), 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<sub>1</sub>) with 27 Causal Variables

Fig. 2 presents the step down multiple regression. It has been found that the variables gross return (Rs/Bigha) (X<sub>25</sub>), area under pulse cultivation (Bigha)(X<sub>5</sub>), training Received (X<sub>27</sub>), productivity or yield (Kg/Bigha) (X<sub>24</sub>), farmer's attitude towards pulse crop cultivation (X<sub>14</sub>) 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<sub>1</sub>).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<sub>1</sub>) 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<sub>25</sub>) has exerted highest direct effect on socialization of pulse enterprise (Y<sub>1</sub>) followed by area under pulse cultivation (Bigha) (X<sub>5</sub>) and productivity or yield (kg/Bigha) (X<sub>24</sub>). In case of indirect effect on socialization of pulse enterprise (Y<sub>1</sub>)have area under pulse cultivation (X<sub>25</sub>) and followed by gross return (Rs/ Bigha) (X<sub>25</sub>) and farmer's attitude towards pulse crop cultivation (X<sub>14</sub>).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<sub>5</sub>). So, it could be inferred that these variables have got both substantive and associating properties to characterize the socialization of pulse enterprise (Y<sub>1</sub>).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<sub>1</sub>).The residual effect being 0.2124, it is to conclude that 21.24 per cent of variation in this interaction could not be explained.

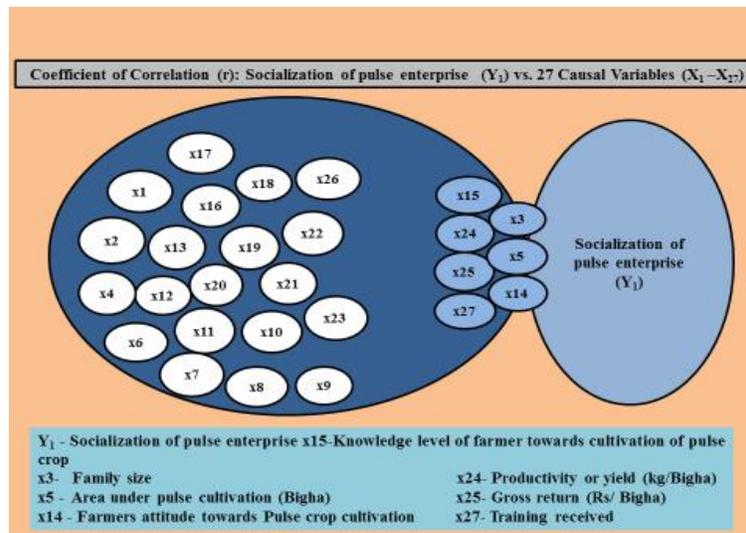


Fig. 1. Model of correlation coefficient of socialization of pulse enterprise (y<sub>1</sub>) with 27 independent variables

**Table 1. Coefficients of multiple regression analysis of socialization of pulse enterprise (Y<sub>1</sub>) with 27 causal variables**

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

**Table 2. Multiple regression analysis of socialization of pulse enterprise (Y<sub>1</sub>) with 27 causal variables (model summary)**

Model	R	R square	Adjusted R square	Std. error of the estimate	Change statistics				
					R square change	F change	df1	df2	Sig. F change
1	0.887 <sup>a</sup>	0.787	0.740	43.730079	0.787	16.741	27	122	0.000

**Table 3. Path analysis of comprehensive Socialization of pulse enterprise (Y<sub>1</sub>) with 27 causal variables**

Variables	Total effect	Direct effect	Indirect effect	Substantial effect		
				I	II	III
1. Age (X <sub>1</sub> )	-0.0433	- 0.012	-0.0310	-0.0238 X5	-0.0133 X14	0.0098 X24
2. Education (X <sub>2</sub> )	0.0312	0.0178	0.0133	0.0149 X25	-0.0116 X15	-0.0105 X5
3. Family size (X <sub>3</sub> )	0.2380	-0.0433	0.2813	0.1299 X5	0.1053 X25	0.0144 X27
4. Family education (X <sub>4</sub> )	-0.0231	0.0138	-0.0369	-0.0159 X5	-0.0145 X25	-0.0125 X15
5. Area under pulse cultivation (Bigha) (X <sub>5</sub> )	0.8300	0.3609 (II)	0.4691 (I)	0.3549 X25	0.0564 X14	0.0352 X27
6. Farm size and technology adoption (Bigha) (X <sub>6</sub> )	0.0488	-0.0141	0.0629	0.0381 X7	0.0224 X5	-0.0083 X24
7. No of crop diversity (X <sub>7</sub> )	-0.0935	-0.0553	-0.0382	-0.0318 X5	-0.0236 X25	-0.0130 X15
8. Income (Rs /per capita/annum) (X <sub>8</sub> )	-0.0415	0.0162	-0.0578	-0.0336 X24	-0.0130 X25	-0.0077 X3
9. Risk Orientation (X <sub>9</sub> )	-0.0642	0.0272	-0.0914	-0.0444 X25	-0.0437 X5	-0.0149 X15
10. Scientific Orientation (X <sub>10</sub> )	0.0351	-0.0629	0.0980	0.0285 X5	0.0228 X25	0.0223 X15
11. Planning orientation (X <sub>11</sub> )	0.0159	0.0319	-0.0160	-0.0198 X24	0.0152 X27	-0.0077 X10
12. Production orientation (X <sub>12</sub> )	-0.0141	-0.0157	0.0016	-0.0152 X5	-0.0097 X15	0.0070 X24

Variables	Total effect	Direct effect	Indirect effect	Substantial effect		
				I	II	III
13. Market Orientation (X <sub>13</sub> )	0.0901	0.0544	0.0357	0.0206 X5	0.0164 X27	0.0141 X25
14. Farmers attitude towards Pulse crop cultivation (X <sub>14</sub> )	0.5230	0.1163	0.4067 (III)	0.1992 X25	0.1750 X5	0.0251 X15
15. Knowledge level of farmer towards cultivation of pulse crop (X <sub>15</sub> )	0.3910	0.0998	0.2912	0.1234 X25	0.1213 X5	0.0293 X14
16. Knowledge about insecticide (X <sub>16</sub> )	-0.0078	-0.0059	-0.0018	-0.0086 X25	-0.0076 X15	0.0057 X24
17. Knowledge about fungicide (X <sub>17</sub> )	0.0657	-0.0414	0.1071	0.0362 X25	0.0260 X5	0.0150 X15
18. Knowledge about weed control (X <sub>18</sub> )	0.0147	0.0232	-0.0085	-0.0125 X24	-0.0097 X15	-0.0071 X25
19. Knowledge about IPM practice (X <sub>19</sub> )	0.0504	-0.0211	0.0716	0.0343 X5	0.0338 X25	-0.0138 X24
20. Farmers attitude towards IPM programme (X <sub>20</sub> )	0.0560	0.0037	0.0523	0.0275 X25	0.0245 X5	-0.0105 X14
21. Attitude towards adoption (X <sub>21</sub> )	0.0486	0.0066	0.0420	0.0181 X24	0.0158 X15	-0.0107 X13
22. Attitude towards discontinuous (X <sub>22</sub> )	0.0839	-0.0205	0.1044	0.0365 X25	0.0260 X5	0.0130 X14
23. Attitude towards rejection (X <sub>23</sub> )	-0.0276	0.0221	-0.0497	-0.0296 X5	-0.0130 X25	0.0084 X10
24. Productivity or yield (kg/Bigha) (X <sub>24</sub> )	-0.2020	-0.1275 (III)	-0.0745	-0.0385 X25	-0.0375 X5	-0.0170 X15
25. Gross return (Rs/ Bigha) (X <sub>25</sub> )	0.8340	0.3930 (I)	0.4410 (II)	0.3259 X5	0.0589 X14	0.0348 X27
26. Utilization/Information/Cosmopolite (X <sub>26</sub> )	-0.0653	0.0053	-0.0706	-0.0223 X15	-0.0199 X5	-0.0070 X13
27. Training received (X <sub>27</sub> )	0.3780	0.1170	0.2610	0.1167 X25	0.1086 X5	0.0208 X14

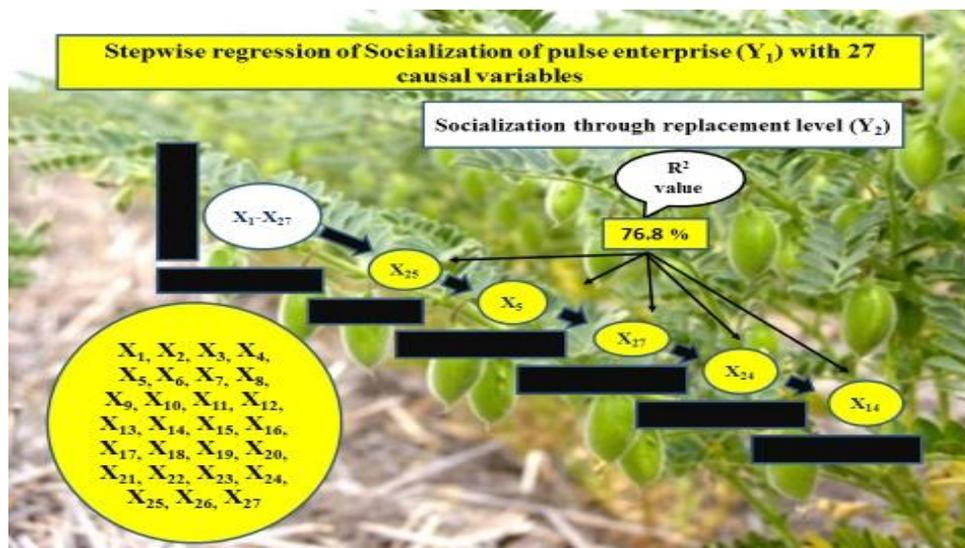


Fig. 2. Model of stepwise regression analysis of Socialization of pulse enterprise ( $Y_1$ ) with 27 causal variables

#### 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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