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RESEARCH ARTICLE

Exploring The Level of Livelihood Security of The Farmers Adopted Integrated Farming System in West Bengal

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ABSTRACT

The present study was conducted at three blocks of Cooch Behar district in West Bengal due to the availability of farmers adopted the Integrated farming system for securing their livelihoods. A multistage, purposive and random sampling methods were followed in case of selecting the respondents for the present study. A structured interview schedule was prepared and personal interview method was used for data collection. A total of 175 farmers taken for the study who adopted Integrated Farming System for securing their livelihood. Level of livelihood security was taken as dependent variable and other 21 independent variables were considered for the study to explore the relational dispositions. The study revealed that majority of the farmers (57.14 %) were in the category of medium level of livelihood security followed by high level (24.00%) and low level of livelihood security (18.86%). The independent variables education, family education status, occupation, annual family income, annual family expenditure, land holding, irrigation facilities, material possession, animal possession, credit seeking behaviour, information seeking behaviour, social participation, scientific orientation, economic orientation, innovativeness and management efficiency had shown positive and significant association with the livelihood security and only the variable material possession had shown positively and significantly contributing towards characterising the dependent variable, level of livelihood security.

Key words: Level of livelihood security; Material possession; Integrated farming system; Regression for characterisation; Management efficiency.

More than two-thirds of the poorest people in the world live in rural areas and working in subsistence agriculture (Todaro & Smith, 2009). It has been evident that in developing countries one per cent growth in GDP of agriculture increases the expenditures of the poor at least 2.5 times more than the growth that we see from other sectors (Ligon and Sadoulet 2007). Clearly, the value of agriculture in the rural people's lives cannot be under estimated. Indian agriculture is mainly characterized by many issues like maximum number of small & marginal farm holdings, weather un certainties, price fluctuations, high interest rates by local money lenders for the farmers etc. Among all these issues low land holding of the farmers is most concerning one. As a result of increasing population growth and small farm sizes, the agricultural sector's carrying capacity is dwindling

(Sisay, 2010). The average size of an operational holding has decreased to 1.08 hectares in 2015-16, down from 1.15 hectares in 2010-11 (Agriculture Census 2015-16). In India, the average size of land holding for small and marginal land holdings is very low which is less than one ha. and they cannot create employment and income adequate for their livelihood and for this reason, they were forced to live below poverty line (Anon. 2012). Small and marginal holdings (2 ha) now account for eighty-six per cent of total land holdings, while large holdings (>10 ha) account for only 0.57 per cent. Every year, approximately one per cent of agricultural land is taken away for urbanisation, reducing the availability of land for cultivation. There are 71.23 lakh farm families in the state, with ninety-six per cent of them being small and marginal farmers (Anonymous, 2021).

The majority of the land is rainfed and even irrigated areas are subject to the whims of the monsoon. Against these clumsy backdrops, the scope for increasing rural people's real income and bringing about long-term improvements in their well-being solely through farming operations is severely limited. Over the last decade, securing livelihoods has become increasingly recognised as an important component of long-term development. However, in India, small and marginal farmers' land-based livelihoods are increasingly becoming unsustainable, as their land is no longer capable of meeting the needs of the family and fodder for their cattle (*Hiremath 2007*). As a result, rural households are being forced to seek alternate sources of income. This might be the reason for the rural people migrating to urban areas. Problems of low availability of water for cultivation, land availability, nutrient depletion in soil, non-agricultural jobs; consequent to this per centage of people engaged in agriculture sector is gradually declining. This also a cause for the agricultural community to leave their rural habitat and to come in urban areas (*Chakraborty et. al, 2021*). To decrease the migration of rural people, there is a need to secure their livelihoods. So, there is a need to study the level of their livelihood security. Livelihood diversification or dependence on many sources of income generation, might become one of the most essential possibilities for enhancing farmers' livelihoods (*Chauhan et. al 2022*). The majority of the respondents diversified their livelihoods in to numerous activities and earned a considerable amount of income from multiple sources (*Goutam and Jha, 2022*). Livelihood was operationally defined as the means and ways of living to meet the minimum needs of an individual and family. A livelihood consists of the skills, assets (material and social resources), and activities required for a living. Livelihood security was defined as farm families' ability to obtain adequate access to and availability of income and other resources to meet basic needs such as food, nutrition, health care, clean environment, habitat facilities, educational opportunities, community participation, social integration, and so on. Keeping these in view the present study was conceptualized and operationalized with the aims to find out the level of livelihood security of the farmers and to explore the intra and inter level relationship between profile characteristics of the farmers, adopted Integrated Farming System with their level of livelihood security.

METHODOLOGY

The present study was conducted in the Cooch Behar-I, Cooch Behar-II and Dinhata-II blocks of the Cooch Behar district. A multistage, purposive and random sampling procedures were followed in selecting the respondents for this study. Out of twelve blocks, three blocks were selected randomly and from each block, two villages were selected randomly. Respondents were selected purposively based on the pilot study conducted in each village. The total number of respondents was 175 who were adopted integrated farming system from all selected six villages of three blocks. The data were collected with the help of structured interview schedule through personal interview method. The collected data were processed into the statistical tools like frequency, per centage, mean, standard deviation, coefficient of variation, correlation coefficient and regression. For the present study twenty-one independent variables and one dependent variable namely level of livelihood security was selected for the study. In case of measuring level of livelihood security, the livelihood security index was measured with the help of slightly modified index developed by *Baby (2005)*. *Baby (2005)* has identified seven various dimensions of livelihood security and gave them weightage based on their perceived importance in determining rural households' livelihood security. The most important dimension emerged was household food security, followed by occupational security, habitat security, health security, and environmental security, social security and educational security in descending order of the significance.

RESULTS AND DISCUSSION

The following table represents the profile characteristics of the farmers adopted Integrated Farming System in the study area.

Table 1 shows the details about the profile characteristics of the respondents. In case of socio-personal variables, there are variables like age, education, family size, dependency ratio, family education status and farming experience, occupation. Majority of the farmers are young, followed by middle aged and old aged with a mean of 41.31. In case of education with a mean score of 2.17, most of the respondents had an education level of college and above followed by higher secondary education and primary education. All the farmers were almost

Table 1. Profile characteristics of respondents

Variable	No.	%	Statistics
<i>Socio-personal variables</i>			
<i>Age (X₁)</i>			
Young	84	48.00	Mean : 41.31
Middle aged	47	26.86	S.D. : 16.09
Old	44	25.14	C.V. : 38.96
<i>Education (X₂)</i>			
Illiterate	0	0 %	Mean : 2.17 S.D. : 0.79 C.V. : 36.75
Primary	43	24.60	
Higher secondary	59	33.70	
College and above	73	41.70	
<i>Family size (X₃)</i>			
Small	85	51.43	Mean : 4.77
Medium	90	48.57	S.D. : 1.78
Big	0	0	C.V. : 37.42
<i>Dependency ratio (X₄)</i>			
Low	78	44.60	Mean : 1.97
Medium	25	14.30	S.D. : 0.92
High	72	41.10	C.V. : 47.20
<i>Family education status (X₅)</i>			
Low	34	19.42	Mean : 2.74
Medium	113	64.57	S.D. : 1.08
High	28	16.01	C.V. : 39.71
<i>Farming experience (X₆)</i>			
Low	60	34.30	Mean : 2.02
Medium	52	29.70	S.D. : 0.84
High	63	36.00	C.V. : 41.67
<i>Occupation (X₇)</i>			
Farming +AH	31	17.10	Mean : 4.38
Farming + AH + Service	82	46.90	S.D. : 1.41
Farming + AH + Bussiness	62	36.00	C.V. : 32.26
<i>Socio-economic variables</i>			
<i>Annual family income (X₈)</i>			
Low	20	11.40	Mean : 2.51
Medium	45	25.70	S.D. : 0.69
High	110	62.90	C.V. : 27.58
<i>Annual expenditure (X₉)</i>			
Low	25	14.28	Mean : 0.96
Medium	69	39.42	S.D. : 0.32
High	81	46.30	C.V. : 33.51
<i>Land holding (X₁₀)</i>			
Low	28	16.00	Mean : 4.15
Medium	106	60.57	S.D. : 1.59
High	41	23.43	C.V. : 38.42

<i>Irrigation facilities (X₁₁)</i>			
Low	24	13.70	Mean : 2.86
Medium	90	61.40	S.D. : 1.13
High	69	34.90	C.V. : 39.66
<i>Material Possession (X₁₂)</i>			
Low	30	17.14	Mean : 19.02
Medium	109	62.28	S.D. : 7.11
High	36	20.57	C.V. : 37.43
<i>Animal Possession (X₁₃)</i>			
Low	29	16.57	Mean : 5.78
Medium	92	52.57	S.D. : 1.96
High	54	30.85	C.V. : 33.97
<i>Credit seeking behaviour (X₁₄)</i>			
Low	29	16.60	Mean : 7.18
Medium	97	61.10	S.D. : 2.41
High	39	22.30	C.V. : 33.69
<i>Social participation (X₁₅)</i>			
No membership	0	0	Mean : 2.21 S.D. : 0.77 C.V. : 35.15
One organization	38	21.70	
More than one organization	62	35.40	
Membership with position	75	42.90	
<i>Information seeking behaviour (X₁₆)</i>			
Low	33	18.86	Mean : 18.84
Medium	94	53.71	S.D. : 5.93
High	48	27.43	C.V. : 31.49
<i>Scientific orientation (X₁₇)</i>			
Low	35	20.00	Mean : 28.85
Medium	91	52.00	S.D. : 10.47
High	49	28.00	C.V. : 36.31
<i>Risk orientation (X₁₈)</i>			
Low	41	23.43	Mean : 28.91
Medium	98	56.00	S.D. : 8.71
High	36	20.57	C.V. : 30.12
<i>Economic orientation (X₁₉)</i>			
Low	33	18.86	Mean : 29.52
Medium	107	61.14	S.D. : 10.72
High	35	20.00	C.V. : 36.32
<i>Innovativeness (X₂₀)</i>			
Low	56	32.00	Mean : 1.99
Medium	65	37.10	S.D. : 0.79
High	54	30.90	C.V. : 39.97
<i>Management Efficiency (X₂₁)</i>			
Low	36	20.57	Mean : 60.87
Medium	99	56.57	S.D. : 17.44
High	40	22.86	C.V. : 28.65

equally divided into small and medium sized families and no farmer were in the category of big family size and the mean score of the family size is 4.77. When it comes to dependency ratio, the mean score is 1.97 with most of them were in low dependency level category followed by high and medium. In case of family education status, majority of them belongs to medium level of family education status followed by low and high with a mean score of 2.74. Most of the farmers are having high farming experience followed by low and medium farming experiences with a mean score of 2.02. The variable occupation is distributed with a mean score of 4.38 and it is found that the farmers with the occupation of farming along with animal husbandry and service are more in number, followed by farming along with animal husbandry and business and farming with animal husbandry.

Under the socio-economic variables the variables annual family income, annual family expenditure, land holding, irrigation facilities, material possession and animal possession are considered. In case of annual family income, the mean score is 2.51 and majority of the farmers having high income level followed by medium and low levels. In case of land holding, the average land holding size is 4.15 and out of all the respondents, there are a greater number of small farmers followed by medium and marginal farmers. When it comes to annual expenditure, majority of the respondents belong to high level of annual expenditure category followed by medium and low categories with a mean score of 0.96. As per material possession, most of the respondents have medium level of material possession followed by high and low levels and the mean score is 19.02. Farmers with medium level of animal possession are more than fifty per cent followed by high and low level of animal possessions. Irrigation status with a mean score of 2.86, has the majority farmers under medium level of irrigation status followed by high and low.

In the category of socio-psychological variables credit seeking behavior, social participation, information seeking behavior, scientific orientation, risk orientation, economic orientation, innovativeness, and management efficiency are there. In case of credit seeking behavior, majority of the farmers are under medium credit seeking behavior followed by high and low levels with a mean score of 7.18. Information seeking behaviours mean score is 18.84 with majority of the farmers belonging to medium level of

information seeking behavior followed by high and low levels. In case of social participation with a mean score of 2.21, majority of the respondents were having membership with position in organization followed by next majority were having membership in more than one organization and few of them have membership in one organization. Majority of the respondents have medium level of scientific orientation followed by high and low levels with a mean score of 28.85. Risk orientation with a mean score of 28.91, is having the majority of candidates under medium level followed by low and high levels. In case of economic orientation, most of the farmers belongs to medium level followed by high and low with a mean of 29.52. When it comes to innovativeness, the mean score is 1.99 with majority of the farmers in medium level category, followed by low and high. Management efficiency with a mean score of 60.87, has the majority respondents under medium level followed by high and low.

Level of livelihood security : Livelihood security is a farm families' ability to obtain adequate access to and availability of income and other resources to meet basic needs such as food, nutrition, health care, clean environment, habitat facilities, educational opportunities, community participation, social integration, and so on. Table 2 indicates that the mean score of level of livelihood security of the respondents is 70.83 and majority of the farmers had level of livelihood security of medium level followed by high and low levels respectively. The data given here is of 175 farmers who adopted Integrated farming System. With the help of integrated farming system approach, the farmers can avoid the risk of crop failures, which is very common in mono cropping or specialised farming system. So the income will be stable for these integrated farming system farmers. That is the reason for having a mean score of level of livelihood security as 70.83 and the majority of the respondents under the category of medium level of livelihood security followed by high and medium levels.

Table 2. The distribution of the respondents according to their level of livelihood security

Variable	Category	No.	%	Mean	S.D.	C.V.
Level of livelihood security	Low	33	18.86	70.83	26.16	36.93
	Medium	100	57.14			
	High	42	24.00			

Table 3 reflects the correlation between the level of livelihood security and other twenty-one independent variables. It is indicated that the independent variables like education, family education, occupation, annual family income, annual family expenditure, land holding, irrigation facilities, material possession, animal possession, credit seeking behaviour, information seeking behaviour, social participation, scientific orientation, economic orientation, innovativeness and management efficiency have shown positive and significant association with the variable level of livelihood security. There is a scope for the farmers to explore new things who are having more educational qualifications so that chances of getting more income by trying the new explored things at field conditions is more so that their livelihoods get secured. The family having the more number of educated members will be having more knowledge when compared to families having less education status so that the co-ordination will be better among them while trying new technologies, so that their livelihood security will be improved. In case of occupation, if a family having

any business and job holders along with farming will earn more money so that their standards of living will be better. Annual income plays a vital role in securing any family. The families with more annual income can afford good education to their children, can provide better health facilities and habitat security so that their level of livelihood security will also improve. A family spending more money as their annual expenditure means, their standards of living is good so that their livelihood security also in a good position. Better irrigation facilities to a farm helps in gaining better yields from the agriculture so that it can improve the income of a family. Having high level of material possession helps to try new technologies in field and cost for labour and renting for machinery will also be reduced so that it can give good profits to the farmer. Farmers with high number of different kinds of animals in their farm will earn extra income by selling the milk, eggs and meat when compared to the farmers having less number of animals and it will reflect in the level of livelihood security. Credit seeking behaviour leads to lending money from different sources so that the investment on different enterprises is possible, which leads to increase in their income and livelihood security level. The farmers with high social participation will be exposed to new thing and technologies related to agriculture so that it can contribute to improve their level of livelihood security. Information seeking behaviour explains from how many sources the farmer is gathering information to improve his farming. High level of information seeking behaviour leads to better gaining of knowledge and application on field conditions which helps to increase their yield as well as income and secures their livelihoods. Farmers having scientific orientation means they have faith in science and a scientific approach in solving problems in their agricultural occupation, and following scientific approaches at field level can help in giving good results to the farmers which also contributes to livelihood security. Economic orientation measures occupational success in terms of profit maximization and the relative value that an individual places on economic ends. Higher economic orientation leads to more profit gains which improves the level of livelihood security. Innovativeness is the degree to which an individual or other unit of adoption adopts new ideas relatively earlier than other members of a social system. Early adoption of an innovation leads

Table 3. Correlation of independent variables with Level of livelihood security

Variable	Correlation
Age (X_1)	-0.130
Education (X_2)	0.348**
Family size (X_3)	-0.048
Dependency ratio (X_4)	-0.078
Family education (X_5)	0.240**
Occupation (X_6)	0.350**
Farming experience (X_7)	-0.111
Family income (X_8)	0.553**
Family expenditure (X_9)	0.531**
Land holding (X_{10})	0.468**
Irrigation facilities (X_{11})	0.305**
Material possession (X_{12})	0.718**
Animal possession (X_{13})	0.337**
Credit seeking behaviour (X_{14})	0.299**
Social participation (X_{15})	0.373**
Information seeking behaviour (X_{16})	0.243**
Scientific orientation (X_{17})	0.241**
Risk orientation (X_{18})	-0.039
Economic orientation (X_{19})	0.178*
Innovativeness (X_{20})	0.375**
Management efficiency (X_{21})	0.373**

**Significant at 1%, *Significant at 5% level of significance

to complete utilisation of that innovation, which intern helps in increasing the income as well as livelihood security of the farmers. Management efficiency focuses on individual’s ability to effectively manage an enterprise and achieve higher levels of performance through efficient management of available resources with profit maximization. Farmers with higher level of management efficiencies can manage more than one enterprise at a time, so their income & standards of livings will be better than the farmers having less management efficiency so that their level of livelihood security will also be higher.

Table 4 presents regression analysis between level of livelihood security and other 21 independent variables. The variable material possession and social participation are contributing positively and

significantly in case characterising the level of livelihood security. The farmers adopted integrated farming system with better material possession have enjoyed the opportunity to try new technologies on their farms without depending on others for any loans to purchase implements and machinery. The labour cost will also be reduced due to the presence of machinery. They have the acumen to take ample risk for diversifying the livelihood alternatives. The social participation is also contributing to keep the farmers up-to-date with diversified information for enhancing the productivity and profitability from their farm with integrated farming system. The appropriate information received from different social organisation and the social values empowers the farmers with integrated farming system to secure their livelihood patterns. This may be the plausible reason behind the outcome of the regression analysis. The R² value is 0.666 which indicates that twenty one independent variables put together has explained 66.60 per cent variation embedded with the level of livelihood security. But still 33.40 per cent variation embedded with predicted one is unexplained. So it is concluded that for better explicability, there is scope to incorporate more contextual variables.

CONCLUSION

Livelihood security is the only indicator of maintaining the livelihood status of the farming community through different livelihood alternatives. The integrated farming system can create an enabling environment to supply food and income from different livelihood alternatives at a time. Consequently there is very little risk for securing the livelihood through the farm output. The present study clearly indicates that to improve the level of livelihood security of the farmers adopted integrated farming system the due emphasis must be given on educational and family educational status of the farmer. The awareness building extension approaches regarding enhancing the education status should be implemented at the grassroot level to ensure the livelihood security. Irrigation facilities should be provided for the farmers who are not having any irrigation facilities as their own at their farms. Farmers should know the benefit of having other income sources than the agriculture. To improvise their credit seeking behaviour, farmers should be given training regarding loans given by different banks with the interest rates. In case of social participation, the

Table 4. Regression analysis of respondents’ level of livelihood security with independent variables

Variable	Unstandardized coefficients		Beta	‘t’ value
	B	SE		
Age (X ₁)	-0.017	0.081	-0.010	-0.210
Education (X ₂)	-1.098	2.140	-0.033	-0.513
Family size (X ₃)	0.722	0.738	0.049	0.979
Dependency ratio (X ₄)	-1.130	1.393	-0.040	-0.811
Family education (X ₅)	1.458	1.257	0.061	1.160
Occupation (X ₆)	0.610	1.154	0.033	0.528
Farming experience (X ₇)	1.035	1.666	0.033	0.621
Family income (X ₈)	3.864	2.871	0.102	1.346
Family expenditure (X ₉)	8.857	6.607	0.110	1.341
Land holding (X ₁₀)	1.034	1.224	0.063	0.844
Irrigation facilities (X ₁₁)	-0.625	1.308	-0.027	-0.478
Material possession(X ₁₂)	1.978	0.201	0.538	9.824**
Animal possession (X ₁₃)	0.517	0.802	0.039	0.644
Credit seeking behaviour (X ₁₄)	-0.271	0.617	-0.025	-0.439
Social participation (X ₁₅)	5.047	1.880	0.150	2.684**
Information seeking behaviour (X ₁₆)	0.287	0.224	0.065	1.282
Scientific orientation(X ₁₇)	0.116	0.132	0.046	0.876
Risk orientation (X ₁₈)	-0.117	0.149	-0.039	-0.782
Economic orientation(X ₁₉)	0.109	0.121	0.045	0.896
Innovativeness (X ₂₀)	2.598	1.992	0.079	1.304
Management efficiency(X ₂₁)	0.014	0.090	0.009	0.159
R ² (0.666)				

concerned department officials should make sure that every farmer should be a member in at least one social organization which is useful to them. To improve information seeking behaviour, farmers should be informed about different sources of information from where they can get information regarding different issues related to farms. In case of scientific orientation, farmers should be given a demonstration about the differences between farming done by following scientific approaches and by non-scientific approaches, so that they will know the importance of scientific approaches in farming. To improve economic orientation, training should be given on profit oriented enterprises related to agriculture and allied sectors. To induce innovativeness in them, the results of innovation or technology which were already applied by the innovative farmers should be demonstrated to them so that they can understand the usefulness of adopting any new technology as early as possible. To build the qualities of effective management abilities, trainings should be provided to them on capacity building and management strategies. The government and concerned officials should focus on recommendations to prepare a concrete policy for enhancing the livelihood security of the farmers with integrated farming system to open up a new vista for the pro-poor peasants of the country.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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