Self-Sufficiency of Rice Consumption and Farm Entrepreneurship of Operating Farmers in Rural Areas of West Bengal, India: An Empirical Interpretation from Socio-Personal, Agro-Economic, Socio-Psychological and Communicative Variables

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Authors' contributions

This work was carried out in collaboration among all authors. Author DR collected data and performed the statistical analysis. Author SG managed the literature searches and wrote the first draft of the manuscript. Authors AG and DM helped in preparation of manuscript. Authors SKA and AB designed the study, managed the interpretation of the analyses and supervised the work. All the authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aims: The major objectives of the study are to elucidate the distributive characters of operating farms in the selected locale of the study, to delineate a micro level policy so that the constraints of the operating farms can be analyzed and intervention programmes can be operationally described, to estimate and analyze the nature and direction of interaction among the independent and dependent variables.
Study Design: The locale was selected by purposive as well as simple random sampling techniques and the respondents following rice cultivation had been interacted and were selected by the simple random sampling method.

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Place of Study: Village Rasulpur of Memari-1 block of Purba Bardhaman district in West Bengal was purposively selected for the study.

Methodology: In this study 50 respondents following rice cultivation have been interacted and are selected by the simple random sampling method. A preliminary interview schedule has been administered to understand the knowledge, perception and attitude of the people towards climate changes concept, communication and extension system, farm enterprises, challenges faced during rice production. The collected data had been put into multivariate analysis. Statistical Package for the Social Sciences V20.0 (SPSS) of IBM was used for correlation analysis, multiple regression analysis, step-down regression analysis, path analysis and factor analysis.

Results: Independent variables economic land (x7), group interaction (x11), innovation proneness (x13) and market orientation (x14) have been found to exert strong and determining contribution to estimate dependent variable self-consumption of rice production (y) and the set of economic and ecological variables as selected for the study.

Conclusion: It can be concluded that the dynamics of self-sufficiency of food grains and entrepreneurship, here in case of rice enterprises, are dominantly relying on the entrepreneurs' behavioural characters, the group interaction they are experiencing, the economic land they are possessing, the electricity consumption level, and the fuel use efficiency, innovation proneness and market interaction.

1. INTRODUCTION

Indian peasantry, the largest body of surviving small farmers in the world, today faces a crisis of extinction. Two thirds of India makes its living from the land. The earth is the most generous employer in this country that has farmed this land for more than 5000 years. However, as farming is delinked from the earth, the soil, the biodiversity, the climate are linked to global corporations and global markets, and the generosity of the earth is replaced by the greed of corporations; the viability of small farmers is destroyed [1]. Agriculture has undergone profound changes and farmers are facing a wide range of stressors [2]. Unpredictable climate changes jeopardize food production and food security globally and, in the poorer countries especially in India. Being a tropical country, India is more vulnerable to this frequently changing pattern characterized by irregular and untimely rainfalls along with extended summers and winters [3]. Though, after independence, India achieved tremendous success in many fields but still much is needed to be done in order to become a developed nation. Statistics betrays that after independence our growth rate has increased from 3% to 9%. But, still we are facing problems like poverty, illiteracy, unemployment etc. Besides, a major chunk of population living in villages is still backward. Though the government is spending millions of rupees in the name of rural development, but still it's not getting the desired results [4].

More than half of the population in India is related to agriculture and its allied sectors for their survival and livelihood. In this neo-agricultural era, India is experiencing a rapid change in population curve as well as in technological intervention with human behavior. To coup up with the increasing demand and changing behavior the advancement in agriculture is also needed. It is well-known that how much rice means as a means of food and as well as a commodity for availing foreign exchange in India. Rice is also a staple food for more than half of the world population and in Asia alone more than 2000 million people obtain 60-70 per cent of their calories from rice and its products [5]. In spite of a spectacular growth in the food grain sector during the past two decades, a huge gap exists between availability and requirement of products. Increase in population growth, changing life-style, shifting of food habits, rapid urbanization, increased per capita income, awareness about health care, etc. are contributing towards rising demand of food grains. On the other side to understand the main problems that are faced by the rice farmers, we have to observe and study the ongoing situation in paddy farming. To enhance more export quantity, quality and export earnings in the future, we need to know about the constraints faced in rice export at different stages, in different levels, and by different stakeholders involving in the exporting process to find out the suitable solutions for overcoming the constraints. The main constraints towards farmers are focused in three problems viz. agro-ecological

constraints, technological constraints and socio-economic constraints for understanding the real situations in rice production.

Barun Kumar Paul revealed that farmers incurred losses in paddy cultivation up to 14 times during 2000–01 to 2015–16 except in 2007–08 and 2009–10. They are also being deprived of getting even the minimum support prices (MSP) due to loopholes in government initiatives. The farmers generally miscalculate the cost of cultivation and that is why they perceive the profit margin to be higher. The kinds of cost that they do not calculate include family labour, depreciation charge, interest on capital, the rental value of owned land, and others. Another cause for exaggerated profit is that farmers include income from paddy business as return from agriculture [6]. Non availability of grading facilities in some market yard is serious problem for the farmers due to which they were not getting actual price of produce. Non remunerative price is one of the major constraints for non-adoption of better rice technology which eventually ends in stagnation of production of rice. Due to the collision of traders and official of market yard coupled with non-availability of covered storage facility in the yard, the farmers are compelled to sell their produce to the brokers at the village level. Delay in payment is also added to their woes. It is also evident that price of paddy did not keep pace with price of factors of production. Schemes like MGNREGA competed with agriculture for labour which hiked wage rate in a significant way. The present scenario calls for strong institution pro-farmer policy measure with dedicated will. Also, technological breakthrough for higher net profit is a sine-qua-none [7]. All these factors show the need of self-sufficiency of rice and rice enterprises. The specific objectives of the study are to elucidate the distributive characters of operating farms in the selected locale of the study and to delineate a micro level policy so that the constraints of the operating farms can be analyzed and intervention programmes can be operationally described.

2. MATERIALS AND METHODS

2.1 Respondents

The number of respondents selected for this study is 50. Respondents are mainly rice cultivator.

2.2 Research Locale

The ongoing study was conducted in Purba Bardhaman district. The village Rasulpur of Memari-1 block in the mentioned district of West Bengal state was selected for the study by random sampling method. The area had been selected for the experienced, well versed and venturesome respondents.

2.3 Sampling Design

Purposive as well as simple random sampling techniques were adopted for this study. For selection of state, district and block purposive sampling techniques were adopted because the area was ideal for rice cultivation, convenient for researcher and it had the infrastructural facilities. In case of selection of village and respondents simple random sampling technique was taken up.

2.4 Pilot Study

Before taking up actual fieldwork a pilot study was conducted to understand the area, its people, institution, communication and extension system and the knowledge, perception and attitude of the people towards rice cultivation and its constraints. An outline of the socio-economic background of the farmers of the concerned villages, their opinion towards different types of technologies, socialization process, natural resources, ecology, farm entrepreneurship concept, conflict and confusion helped in the construction of reformative working tools.

2.5 Preparation of Interview Schedule

On the basis of the findings of pilot study a preliminary interview schedule was formed with the help of literature and by the assistance of Chairman of Advisory Committee. The interview schedule consisted of three major parts according to the specific objectives of the study.

2.6 Techniques of Field Data Collection

The respondents were personally interviewed during 2019. The items were asked in Bengali version in simple terms so that the respondents could understand easily. The entries were done in the schedule by student investigator at the time of interview.

Table 1. Sampling technique and sampling design

Step	Items	Level	Approach
1	State	West Bengal	Purposive
2	District	Purba Bardhaman	Purposive
3	Subdivision	Bardhaman Sadar South	Purposive
4	Block	Memari I	Purposive
5	Village	Rasulpur	Random
6	Respondents	50	Random

Total number of respondents: 50

2.7 Variables and their Measurements

Several researchers pointed out that the behavior of an individual could be understood more in depth if one has the knowledge of some variables, which comprised the constructed world of reality within which an individual received the stimuli and acts. The socio personal, agro economic, socio-psychological and communication variables are such type of variables, which determine the behavior of an individual. Appropriate operation and measurement of the variables help the researcher to land upon the accurate conclusion. Therefore, the selected variables for this study had been operated and measured in following manner.

Variables in the present study have been categorized into two main categories.

   i)   Independent variable
   ii)   Dependent variable

2.7.1 Independent variables

The independent variables and their empirical measurements are as follows.

Age (x1), education (x2), family size (x3), per capita income (x4), per capita expenditure (x5), home stead land(x6), economic land (x7), electricity consumption (x8), fuel consumption (x9), market interaction (x10), group interaction (x11), distance matrix (x12), innovation proneness (x13), market orientation (x14), risk orientation (x15).

2.7.2 Dependent Variables

Self-consumption of rice production (y) is selected as dependent variables for the present experiment.

3. RESULTS AND DISCUSSION

The qualitative data is quantified by using specific numerical procedure. Then the quantified data were put under five statistical analysis i.e. correlation analysis, multiple regression analysis, step-down regression analysis, path analysis and factor analysis. The findings and the revelations are discussed below-

3.1 Correlation Analysis

3.1.1 Results

Table 2 presents the coefficient of correlations between self-consumption of rice production (y) and 15 independent variables (x1-x15). It has been found that the variables age (x1), education (x2), family size (x3), per capita income (x4), per capita expenditure (x5), homestead land (x6), economic land (x7), electricity consumption (x8), fuel consumption (x9), group interaction (x11), distant matrix (x12), innovation proneness (x13), market orientation (x14) and risk orientation (x15) have recorded significant correlations with the dependent variable self-consumption of rice production (y).

3.1.2 Revelation

The variables education (x2), per capita income (x4), per capita expenditure (x5), homestead land (x6), electricity consumption (x8), fuel consumption (x9), group interaction (x11), innovation proneness (x13), market orientation (x14) and risk orientation (x15) have recorded a positive and significant correlation with the dependent variable self-consumption of rice production (y). It implies that the rice cultivators as well as rice entrepreneurs gain self-sufficiency in food grains with livelihood upliftment which rely upon various agro-economic factors like moderate level of literacy and education, high per capita income and expenditure, medium to large land holdings, medium to high utilization of fuel and electricity. It is also depending upon different socio-psychological factors like interaction with panchayat leaders, farmers' groups, various development programmers and social service providers; information on new enterprises;

Table 2. Co-efficient of correlation (r): Self-consumption of rice production (y) vs. 15 independent variables (x1-x15)

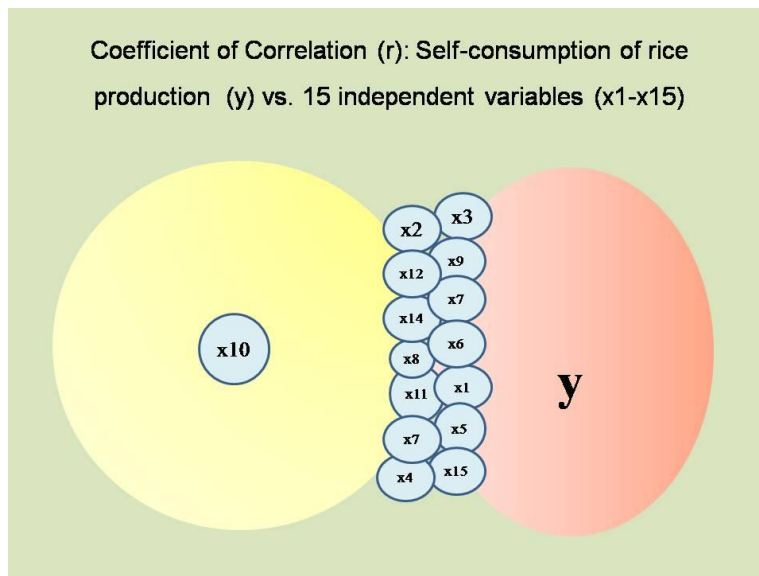| Sl. No.	Independent Variables	'r' Value	Remarks **: significant at 0.01 level *: significant at 0.05 level
1	Age (x1)	-.331	*
2	Education (x2)	.746	**
3	Family size (x3)	-.289	*
4	Per capita income (x4)	.462	**
5	Per capita expenditure (x5)	.498	**
6	Homestead land (x6)	.423	**
7	Economic land (x7)	-.882	**
8	Electricity consumption (x8)	.641	**
9	Fuel consumption (x9)	.495	**
10	Market interaction (x10)	.055	
11	Group interaction (x11)	.825	**
12	Distant matrix (x12)	-.261	*
13	Innovation proneness (x13)	.675	**
14	Market orientation (x14)	.440	**
15	Risk orientation (x15)	.496	**

Fig. 1. Correlation analysis between self-consumption of rice production (y) and 15 independent variables

information on new products, markets and market demand; constrains and risk faced by a cultivator or entrepreneur. On the other hand, age (x1), family size (x3), economic land (x7) and distant matrix (x12) have recorded negative but significant correlation with predicted variable. This indicates that self-consumption of food grain decreases with aging and large family size. As age also effects distance covered by an individual, so distant matrix is a good estimator of self-consumption of rice production.

3.2 Regression Analysis

3.2.1 Results

Table 3 presents the multiple regression analysis where in 15 causal variables have been regressed against the consequent variable self-consumption of rice production (y) to estimate the functional impact of 15 causal variables on the consequent variable self-consumption of rice production (y). The R square value is 96.9 per

cent, which implies that by the conglomeration of 15 causal variables, 96.9 per cent of variance in the consequent variable, self-consumption of rice production (y) has been explained. In other side, per unit change in age (x1), education (x2), family size (x3), per capita income (x4), per capita expenditure (x5), homestead land (x6), economic land (x7), electricity consumption (x8), fuel consumption (x9), group interaction (x11), distant matrix (x12), innovation proneness (x13), market orientation (x14) and risk orientation (x15), positively or negatively, have a reciprocal impact of (+0.002), (+0.186), (+0.074), (+0.016), (+0.040), (-0.013), (-0.620), (+0.196), (-0.057), (+0.125), (+0.101), (+0.122), (+0.077) and (-0.022) unit of change in self-consumption of rice production.

Table 4 presents the stepwise regression analysis to isolate the variables from 15 causal variables, having dominance of effect on consequent variable, self-consumption of rice production (y). In stepwise regression analysis 4 causal variables have been retained in the last step which implies their critical and efficient contribution to the resultant behavior of the variable self-consumption of rice production (y). So, these 4 causal variables are as important as in optimum resource allocation or strategic importance in management of self-consumption of rice production.

3.2.2 Revelation

From Table 4 it has been found that 4 variables economic land (x7), group interaction (x11), innovation proneness (x13) and market orientation (x14) has been the most dominant contributor in estimation of self-consumption of rice production (y). These 4 causal variables together explained 94.6 per cent of the variables from 15 causal variables. Economic land (x7) here has been retained as a causal variable. It is quite obvious that economic land has impact on self-sufficiency and self-consumption of rice production as economic land is a major factor to determine production and productivity. So it can be a good predictor of the variable self-consumption of rice production (y). Group interaction (x11) here also has been retained as a causal variable. The respondents who went for more group interaction, their produce consumed

Table 3. Multiple regression analysis: Self-consumption of rice production (y) vs. 15 causal variables (x1-x15)

Sl. No.	Variables	Reg. Coef. B	S.E. B	Beta	t Value
1	Age (x1)	.002	.050	.002	.036
2	Education (x2)	.186	.071	.186	2.631
3	Family size (x3)	.074	.044	.074	1.663
4	Per capita income (x4)	.016	.210	.016	.075
5	Per capita expenditure (x5)	.040	.155	.040	.255
6	Homestead land (x6)	-.013	.102	-.013	-.123
7	Economic land (x7)	-.620	.073	-.620	-8.505
8	Electricity consumption (x8)	.196	.114	.196	1.717
9	Fuel consumption (x9)	-.057	.089	-.057	-.635
10	Market interaction (x10)	.081	.044	.081	1.857
11	Group interaction (x11)	.125	.094	.125	1.333
12	Distant matrix (x12)	.101	.060	.101	1.686
13	Innovation proneness (x13)	.122	.055	.122	2.227
14	Market orientation (x14)	.077	.044	.077	1.750
15	Risk orientation (x15)	-.022	.043	-.022	-.512

R square: 96.9 per cent

Table 4. Stepwise regression analysis: Self-consumption of rice production (y) vs. 4 causal variables (x7, x11, x13, x14)

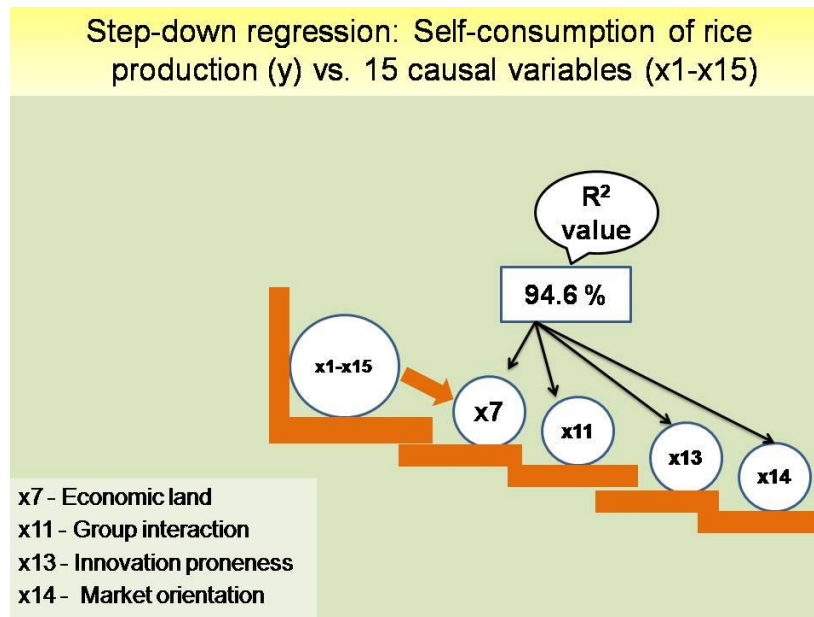| Sl. No.	Variables	Reg. coef. B	S.E. B	Beta	t value
1	Economic land (x7)	-.626	.043	-.626	-14.540
2	Group interaction (x11)	.286	.060	.286	4.728
3	Innovation proneness (x13)	.159	.053	.159	3.018
4	Market orientation (x14)	.114	.040	.114	2.894

R square: 94.6 per cent

Fig. 2. Step-down regression analysis between self-consumption of rice production (y) and 15 causal variables

is higher. It implies that group interaction and discussion with panchayat leaders, other farmers' groups, various development programmers and social service providers give cultivators and entrepreneurs various new ideas and important information which help them to increase yield. It increases self-consumption of rice production of farmers and their family. Innovation proneness (x13) has been retained as a causal variable. Farmers who try to keep themselves up to date with information on new enterprises, try out all new methods on their own form, from time to time want to try several new enterprises are obviously more self-sufficient in case of food grains and also higher in produce consumed than those who are cautious about trying new practices and wait to see what result other farmers obtain before trying the new practices. Market orientation (x14) here has been retained as a causal variable. There is no need to mention that market news is very much useful to an entrepreneur and innovator. Market orientation helps cultivator to know whether one should sell his product to the nearest market irrespective of demand, whether grading of any product is profitable or not, growing crops according to market demand etc. all these are major contributing factors of production and productivity of a crop, income and expenditure of a cultivator. So, market orientation (x14) directly or indirectly is a major attributing factor of self-consumption of rice production (y).

3.3 Path Analysis (Decomposition of Total Effects into Direct, Indirect and Residual Effect)

3.3.1 Results

Table 5 presents the path analysis where in co-efficient of correlation(r) are being decomposed into the direct, indirect and residual effect. The result reveals that variable economic land (x7) has exerted the highest direct effect and group interaction (x11) has exerted the highest indirect effect. So, the functional and operational contribution of economic land (x7) and group interaction (x11) has been the highest on self-consumption of rice production (y).

3.3.2 Revelation

Economic land (x7) has also exerted the highest indirect effect on as many as 9 exogenous variables to characterize the self-consumption of rice production (y). So, no matter how important and effective are the two variables i.e. innovation proneness (x13) and market orientation (x14); economic land (x7) and group interaction (x11) are coming up both directly and indirectly as prime determinant of self-consumption of rice production (y). It is quite easy to depict that area of cultivation and information collected from different groups has tremendous effect on self-

consumption of rice production (y). In path analysis, it has exerted that economic land (x7) has the highest indirect effect on the exogenous variables age (x1), education (x2), family size (x3), electricity consumption (x8), market interaction (x10), group interaction (x11), innovation proneness (x13), market orientation (x14) and risk orientation (x15). So, it can be implied that not only self-consumption of rice

production (y) but economic land (x7) also has impact on before mentioned independent variables.

The residual effect being 2 per cent, it is to conclude that even with a combination of 15 exogenous variables, 2 per cent of variance in consequent variable self-consumption of rice production (y) could not be explained.

Table 5. Self-consumption of rice production (y) vs. 15 exogenous variables (x1-x15)

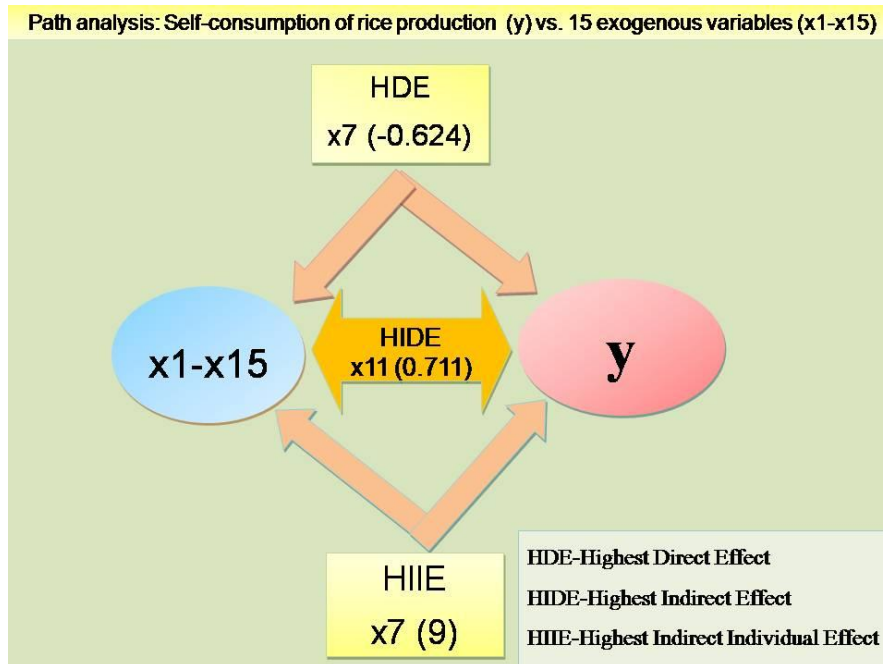| Sl. No.	Variables	Total effect	Direct effect	Indirect effect	Highest indirect effect
1	Age (x1)	-0.331	0.006	-0.337	-0.158 (x7)
2	Education (x2)	0.746	0.194	0.552	0.376 (x7)
3	Family size (x3)	-0.289	0.036	-0.325	-0.181 (x7)
4	Per capita income (x4)	0.462	0.154	0.308	0.175 (x8)
5	Per capita expenditure (x5)	0.498	-0.047	0.545	0.154 (x8)
6	Homestead land (x6)	0.423	-0.001	0.424	0.174 (x8)
7	Economic land (x7)	-0.882	-0.624	-0.258	-0.113 (x2)
8	Electricity consumption (x8)	0.641	0.178	0.463	0.201 (x7)
9	Fuel consumption (x9)	0.495	-0.084	0.579	0.174 (x8)
10	Market interaction (x10)	0.055	0.065	-0.010	-0.132 (x7)
11	Group interaction (x11)	0.825	0.114	0.711	0.364 (x7)
12	Distant matrix (x12)	-0.261	0.067	-0.328	-0.127 (x8)
13	Innovation proneness (x13)	0.675	0.114	0.561	0.249 (x7)
14	Market orientation (x14)	0.440	0.065	0.375	0.125 (x7)
15	Risk orientation (x15)	0.496	-0.039	0.535	0.250 (x7)

Residual effect: 2 per cent

Fig. 3. Path analysis between self-consumption of rice production (y) and 15 exogenous variables

Table 6. Strategic conglomeration of variables into factors

Factors	Variables	Factor loading	% of variance	Cumulative %	Factor renamed
1	Per capita income (x4)	.902	52.907	52.907	Enterprise Ecology
	Per capita expenditure (x5)	.801			
	Homestead land (x6)	.922			
	Electricity consumption (x8)	.793			
	Fuel consumption (x9)	.822			
	Market interaction (x10)	.694			
	Group interaction (x11)	.533			
	Distant matrix (x12)	-.819			
	Innovation proneness (x13)	.549			
2	Economic land (x7)	1.010	15.932	68.840	Market Ecology
	Yield (y1)	-0.917			
	Self-consumption of rice production (y2)	-0.946			
	Produce marketed (y3)	-0.917			
3	Age (x1)	.783	6.818	75.658	Family Ecology
	Education (x2)	-.611			
	Family size (x3)	.719			

3.4 Factor Analysis

3.4.1 Results

Factor analysis is a data reduction analysis and it helps in functional conglomeration of the different variables into a common functional variable. It reduces the information in a model by deducting the dimensions of the observations. This analysis has multiple purposes. It can be used for minimizing the cost, resource rationalization, policy promulgation and simplification of data i.e. reducing the number of variables in predictive regression models. If factor analysis is used for these purposes, most often factors are rotated after extraction.

Table-6 presents the factor analysis for the conglomeration of apparently different 18 variables into 3 numbers of factors based on factor loading.

3.4.2 Revelation

It has been found that factor-1 accommodates nine variables together viz. per capita income (x4), per capita expenditure (x5), homestead land (x6), electricity consumption (x8), fuel consumption (x9), market interaction (x10), group interaction (x11), distant matrix (x12) and innovation proneness (x13) with 52.907 per cent of variance. This factor has been renamed as enterprise ecology. Factor-2 has accommodated four variables together viz. economic land (x7), yield (y1), self-consumption of rice production (y2) and produce marketed (y3) with 15.932 per

cent of variance. This factor has been renamed as market ecology. Factor-3 has accommodated three variables together viz. age (x1), education (x2) and family size (x3) with 6.818 per cent of variance. This factor has been renamed as family ecology.

4. CONCLUSION

The present study has uniquely landed on the value of some important empirical revelation and based on that, it can be concluded that marketability, value addition and branding of rice needs to be enhanced. The characters of entrepreneurship building, management and configuration are predicted from a score of socio ecological and economic variables. The dynamics of self-sufficiency of food grains and entrepreneurship, here in case of rice enterprises, are dominantly relying on the entrepreneurs' behavioural characters, the group interaction they are experiencing, the economic land they are possessing, the electricity consumption level, and the fuel use efficiency, innovation proneness and market interaction. While the entrepreneur ecology is basically a composition of human behaviour and decision making process, resource endowment, communicability and interaction with the surroundings, it is extremely important that to build up successful entrepreneurship, self-sufficiency is much needed. Land is still an important factor and at the same time innovation proneness and market interaction are coming up with swashbuckling impact. But the most

interesting observation is that the rural entrepreneurship is successful when group interaction plays a significant role. The micro-level polices are here derived in the form of recommendation can be called functional policy implication which can go a long in promoting rice industry as a business for its imaged ecological properties and for the most sensible farmers rice-pulse combination can offer the beauty of entrepreneurial symphony.

CONSENT

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

ETHICAL APPROVAL

All experiments have been examined and approved by the appropriate ethics committee.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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