

Socio-Ecological Foundation of Marketable Surplus Generation in Agriculture: The Complexity and Compliances

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Authors' contributions

This work was carried out in collaboration with all authors. Author DR wrote the first draft of the manuscript, collected data and done statistical analysis. Authors AG, SG and DM 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

The study was conducted on Rice and Poultry entrepreneurs in Memari-1 block, Purba Barddhaman district of West Bengal, India. This has been conducted to assess their socio-personal, agro-economical and techno-managerial skills. Several entrepreneurial aspects are considered in this study to portrait a well discernible picture of their entrepreneurship. The acquired data and other information was critically examined with several statistical tools like range, mean, standard deviation, variance, correlation coefficient, stepwise regression analysis, multiple regression analysis, factor analysis and cluster analysis. Total 18 variables were considered for the study in which 15 of them are independent variables and 3 of them dependent variables. Correlation coefficient is significant for the independent variables in case of one dependent variable i.e. produce marketed (y_3). After performing Stepwise Regression analysis several satisfactory conclusions were drawn for the study which well described the current neo agricultural scenario in rural Bengal. It has been recorded that when the economic land is more, then the marketed surplus becomes lower as

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because small holdings entrepreneurs concentrate more in the production phase. Marketed surplus has a positive relationship with the Education level. It has been recorded that Marketed surplus has a positive relationship with electricity consumption also. Having a higher marketed surplus indicate more advancement and betterment in terms of entrepreneurial management and thus fuel use efficiency becomes more prominent and fuel consumption is reduced. It has been recorded that when the innovation proneness and market interaction is higher for the respondents, the marketed surplus is also higher.

Keywords: Agro-economical; challenges; poultry; rice; socio-personal; techno-managerial characters.

1. INTRODUCTION

More than half of the population in India is related to agriculture and its allied sectors for their survival and livelihood. Agricultural cooperatives are important rural organizations supporting livelihood development and poverty reduction [1]. In this neo-agricultural era India is experiencing a rapid change in population curve as well as in technological intervention with human behavior. Micro-enterprises are the keys to generate employment opportunities as well as income earning avenues to both landless, women and landholding people. Therefore, the poverty alleviation in semi-arid regions requires a greater understanding of the interactions of agriculture and allied enterprises and their implications for the household economy. This paper synthesizes the available evidence on agriculture and allied enterprises in watershed development areas and how policy should address the issue to balance between agriculture and micro- enterprises promoted by watershed development programs [2]. To couple up with the increasing demand and changing behavior the advancement in agriculture is also needed. We all know how much Rice means as a means of food and as well as a commodity for availing foreign exchange in India. Same as in case of Poultry industry India is enjoying a rapid growth and is about to become self sufficient in poultry products.

Family poultry production (FP), which is still important in low-income food-deficit countries, is an appropriate system to supply the fast-growing human population with high quality protein. It was found that family poultry farming was chosen by 100% farmers as subsidiary occupation. Small farmers earned an income of Tk. 3705.95 per year as net return from family poultry farming and it generated on average 53.23 working man days per year as employment especially for women. As regards of livelihood improvement, family poultry farming changed food habit, increased knowledge and skill, savings, social status,

recreational facility, improved food nutritional condition, family health and sanitation and enhanced women empowerment [3]. It can also provide additional income to the generally resource-poor small farmers, especially women. Although requiring low levels of inputs, FP contributes significantly to food security, poverty alleviation and ecologically sound management of natural resources [4]. Socio-economic factors of gender, level of education, experience in poultry farming, farm capacity, and number of workers employed, ownership status, training status and financial support status significantly influenced the level of farm management skills. Broiler producers, particularly the female should be trained as the training has significant influence on the level of farm management skills [5]. The poultry industry in India has emerged as the most dynamic and rapidly expanding segment of livestock economy as evident from the production level touching about 40 billion eggs and 1 billion broilers with a compound annual growth rate of 8 percent and 15 percent respectively. Egg consumption was found to grow at a much faster pace than poultry meat with the rise in income and nearly triple by 2020. Similarly, average per capita poultry meat consumption was found to increase from 0.69 to 1.28 kg. Overall study reports the total egg consumption to increase from 687 million kg to 1674 million kg [6]. What was once started as a novelty in the 1970's - egg and broiler production - has now turned out to be a highly organized agri-business. But in spite of all these developments and relatively competitive value of the Indian poultry products (especially egg), the relative position of India in the world trade of poultry products is not so encouraging. Indian poultry industry has been growing at annual varying rates of 8-15 percent and this growth in the past few decades made India 4th largest producer of eggs and 5th largest producer of poultry broilers. Poultry products account for more than 75% of the non-vegetarian items consumed in India. A national support to strengthen the poultry production is required in

the area of finance and input. This is essential for substantial improvements in the contribution of the enterprise to household food production and economic well being of poor farmers. However, a critical gap is still needs to be filled by the research extension outfit in combining the technical and socio-economic aspects of poultry production in order to boost country's egg and meat production [7].

Same as the Rice is a staple food for more than half of the world population and in Asia alone more than 2000 million people obtain 60-70 percent of their calories from rice and its products Rice cultivation is the principal activity and source of income for millions of households around the globe, and several countries of Asia and Africa are highly dependent on rice as a source of foreign exchange earnings and government revenue. The factor influencing the marketed supply of rice is Rice production and price. The rice availability from 2017 to 2020 is projected to increase by 44.56%. Consumption is projected to increase by 20.407 Kg in 2020. For the next 5 years, i.e., 2018-2022, rice availability and surplus positively increase [8]. Per hectare cost of cultivation is about 10 per cent lower in SRI than the conventional method. The logit framework has indicated that age, farm size, income of the farm, number of earners in the family and number of contacts with extension agencies are positive and highly influence the adoption behavior of the farmers. Lacks of skilled labour, awareness, training on new technology and experience have been opined as the main problems in adoption of this technology by the farmers. To sum-up, farmers have been vastly benefited by SRI technology and it has helped them in their socio-economic upliftment. The adoption of SRI technique has helped increase the rice production without increasing the area under its cultivation and has proved to serve as an alternative method for rice cultivation [9]. In Asia, more than 80% of the people live on rice, and their primary food security is entirely dependent on the volume of rice produced in this part of the world. However, rice production increases are now lagging behind population growth. Overall, the total global rice is declining gradually even with the extensive use of the modern varieties such as high yielding and hybrid varieties. Over 90 per cent of the world's rice is produced and consumed in the Asian region comprising 80 per cent of the world's production and consumption. Growth in Asian population (1.8% per annum) in this region means an increase on demand for rice. Although

the net availability of food grains has increased in 2013 at 229 million tones, but there will be a shortage of rice due to increased domestic needs coupled with export demand for rice in future. The growth rates of food grain production in India have declined to 2 per cent during the period 1996-2008 as compared 1986-97 and rice production in India is questionable on economic and ecological grounds. Land size, seed quantity, agrochemicals, labor, gender, extension access, and line planting were significant and positively related to rice output while off-farm income had a negative effect. The results suggest that farmers could improve rice output if assisted in accessing inputs (land, seed, herbicides, and labor), extension services and encouraged to adopt improved rice planting farming practices [10]. It was projected that India will face a shortage of food in the future where prevalence of undernourishment of 12.7 per cent in Asia. Under these circumstances, increasing rice production is an imperative to sustain self-sufficiency and food security in India. Policies that would enhance farmers access to land, fertilizers, improved seeds, herbicides and labour; coupled with strategies for substituting women's time on production activities for non-entrepreneurial activities would likely enhance rice production and gender equity among rice farmers [11].

In spite of a spectacular growth in the poultry sector during the past two decades, a huge gap exists between availability and requirement of poultry products. Poultry immunity, health, and production are several factors that challenge the future growth of the poultry industry. Consumer confidence, product quality and safety, types of products, and the emergence and re-emergence of diseases will continue to be major challenges to the current situation and the strategic future of the industry [12]. The main challenges of the industry include lack of slaughter facilities for small-scale broiler producers, unorganized supply of poor quality feeds and stock, delayed allocation of land by the Land Boards and inadequate extension service. To overcome these constraints, government intervention is required. Despite these constraints, the industry has grown and continues to grow robustly as epitomized by high per capita consumption values [13]. 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 poultry products. Therefore, to meet the domestic

requirement, there is a need of further study of poultry farming in Indian context.

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. Rice production from smallholder farms is challenged because of a lack of fertilizer inputs and nutrient-poor soils. Therefore, improving nutrient efficiency is particularly important for increasing both fertilizer use and rice yield [14]. The most important of these factors are: limited returns as we approach the yield potential of the high yielding varieties, declining productivity in intensive rice production systems, pressures from abiotic and biotic stresses, low returns in developing countries, increasing production costs in industrialized countries, and increasing public concern for the protection of environmental resources [15]. To enhance more export quantity, quality and export earnings in the future, we need to know how about the constraints faced in rice export at different stages, in different levels, and 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.

The objective of the study was to elucidate the distributive characters of operating farms in the selected locale of the study, to identify and estimate the yield and as the dependent variable, a score of agro-economic, socio-personal and techno-managerial variables, to estimate and analyze the nature and direction of interaction among the independent and dependent variables, to delineate a micro level policy, the constrain of the operating farms can be analyzed and intervention programmes can be operationally described.

2. RESEARCH METHODOLOGY

In this chapter research methodology is described to make this study understandable. This chapter includes methods and techniques which were utilized to design it, collect the information as well as the analysis of data to reveal the truth and formulation of theories. This is made under six sub-heads particulars.

a. Locale of Research

- b. Sampling design
- c. Pilot study
- d. Variables and their measurements
- e. Methods and data collection
- f. Statistical tools for data analysis

2.1 Locale of Research

The ongoing study was conducted in Purba Barddhaman district. The village Rasulpur of Memari-1 blocks in the mentioned district of West Bengal state was selected for the study.

- The researcher's close proximity with respect to area, people, officials and local factors.
- The ample opportunity to generate relevant data due to close familiarity of the researcher. Existing responsive respondents of the studied area.
- Prevalence of the characters was under observation.
- Easy accessibility of the area.

2.2 Sampling Design

Selection of state, district, block and village is made by purposive sampling technique and incase of selection of respondents simple random sampling technique was taken up. Total 50 respondents have been selected for the study.

2.3 Pilot Study

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 farm entrepreneurship concept.

2.4 Variables and their Measurements

After pilot study and consulting the advisory committee a list of variables was prepared. On the basis of the selected variables a schedule was prepared.

2.5 Methods of Data Collection

2.5.1 Preparation of interview schedule

On the basis of the findings of pilot study interview schedule was prepared with the help of review literature and by the assistance of chairman of Advisory Committee. The schedule

consists of Agro-economic, socio-personal and techno-managerial.

2.5.2 Pre testing of interview schedule

Main objective of this performance is to detect the discrepancies that have emerged and to eliminate them after necessary modification in the schedule. The individuals who responded in pretesting have been excluded in the final sample for the study.

2.5.3 Techniques of field data collection

The respondents were personally interviewed during festival vacation (Durga puja). The recent situation of COVID-19 pandemic within India hampers the conducted study as well as the plan of work. In spite of that we have tried our best to make this study successful. Local language (Bengali) was used to retrieve the information from the respondent. The entries were done by the student investigator himself at the time of interview.

3. RESULTS AND DISCUSSION

3.1 Coefficient of Correlation (R): Produce Marketed (y₃) and 15 Independent Variables

Fig. 1 presents the coefficient of correlation between produce marketed (y₃) and 15 independent variables. It has been found that, except the variable market interaction (x₁₀); all other variables have significant contribution. So these implied that that the selection of variables is extremely relevant and their impact on produce

marketed (y₃) is significant except the variable Market interaction (x₁₀).

3.2 Multiple Regression Analysis: Produce Marketed (y₃) and 15 Independent Variables

Table 1 presents the multiple regression analysis of Produce marketed (y₃) and 15 causal variables. This implies that the table having these 15 causal variables operated together, 97.30 percent of variance in Produce marketed (y₃) has been explained. So the functional impact of all these 15 causal variables on the consequent variable Produce marketed (y₃) is well discernible.

3.3 Stepwise Regression Analysis: Produce Consumed (y₃) Vs. 15 Causal Variables

The following variables: economic land (x₇), education (x₂), electricity Consumption (x₈), fuel Consumption (x₉), innovation proneness (x₁₃), market interaction (x₁₀) have been retained at the last stage and has contributed together 96.50 percent of variance embedded in the consequent variable, Produce Marketed (y₃). Except these 6 variables the rest 9 causal variables' impact on produce marketed (y₃) is insignificant and minuscule. Almost 99.17 per cent (96.50/97.30 * 100 = 99.17%) of variance has been contributed by these 6 causal variables. So the 6 causal variables have contributed the entirety of total contribution in predicting the Produce Marketed (y₃).

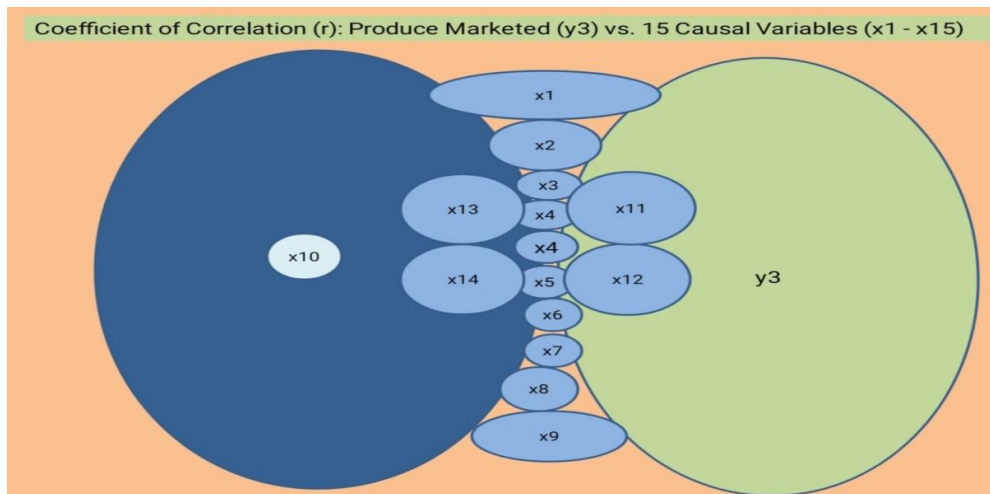


Fig. 1. Coefficient of correlation (r): Produce consumed (y₃) and 15 independent variables

Table 1. Multiple regression analysis: Produce marketed (y_3) and 15 independent variables

Sl. No	Variables	Reg. Coef. B	S.E. B	Beta	t Value
1	Age(x_1)	.005	.047	.005	.105
2	Education(x_2)	.193	.066	.193	2.924
3	Family size(x_3)	.036	.041	.036	.856
4	Income(x_4)	.145	.197	.145	.738
5	Expenditure (x_5)	-.043	.145	-.043	-.297
6	Homestead land(x_6)	.004	.095	.004	.040
7	Economic land (x_7)	-.627	.068	-.627	-9.199
8	Electricity consumption(x_8)	.186	.107	.186	1.742
9	Fuel consumption(x_9)	-.087	.083	-.087	-1.049
10	Market interaction(x_{10})	.066	.041	.066	1.614
11	Group interaction(x_{11})	.107	.088	.107	1.215
12	Distant matrix(x_{12})	.064	.056	.064	1.154
13	Innovation proneness(x_{13})	.112	.051	.112	2.193
14	Market orientation(x_{14})	.065	.041	.065	1.579
15	Risk orientation (x_{15})	-.038	.041	-.038	-.932

R square: 97.30%

The standard error of the estimate: 0.197

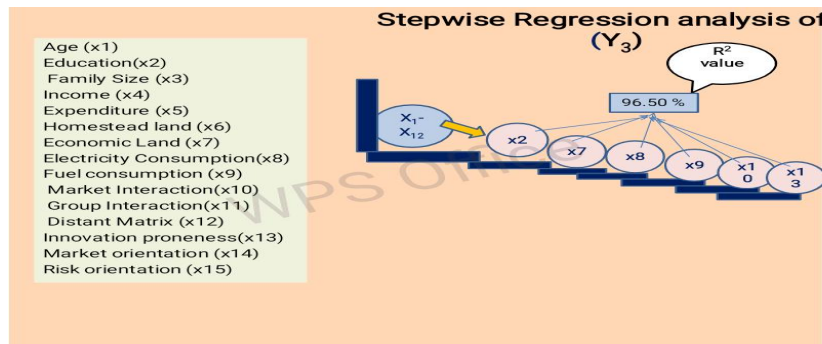


Fig. 2. Stepwise regression analysis: Produce consumed (y_3) vs. 15 causal variables

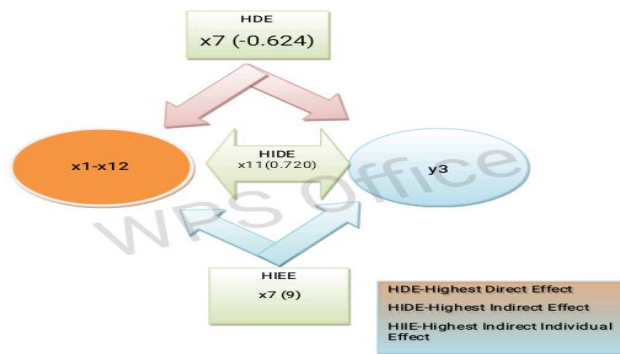


Fig. 3. Path analysis of produce marketed (y_3) and 15 independent variables

It has been recorded that when the economic land is more, then the marketed surplus becomes lower as because small holdings entrepreneurs concentrate more in the production phase. Marketed surplus has a positive relationship with the Education level. It

has been recorded that Marketed surplus has a positive relationship with electricity consumption also. Having a higher marketed surplus indicate more advancement and betterment in terms of entrepreneurial management and thus fuel use efficiency becomes more prominent and fuel

consumption is reduced. It has been recorded that when the innovation proneness and market interaction is higher for the respondents, the marketed surplus is also higher.

3.4 Path Analysis: Decomposition of Total Effect into Direct, Indirect and Residual Effect: Produce Marketed (y_3)

It has been recorded that the Economic land (x_7) has highest direct effect on produce Marketed (y_3) but in negative direction. It implies that when the economic land (x_7) is less the marketed surplus is more because small holdings entrepreneurs is more concentrated in entrepreneurial management. This pattern has been influenced by Group interaction indirectly. The Variable Economic land (x_7) has routed the highest indirect effect to nine variables to ultimately characterize the consequent variable Produce marketed (y_3). So this variable must be focused with high importance with the variable Group interaction (x_{11}).

Residual effect being 0.028, so it can be concluded that with the combination of 15 exogenous variables only 2.8 percent of variance could not be explained.

4. CONCLUSION

The dynamics of entrepreneurship, here in case of rice and poultry enterprises, are dominantly relying with the entrepreneurs' behavioural character, the group interaction they are experiencing, the economic land they are possessing, the electricity consumption level, and the fuel use efficiency and with 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, 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. It has been recorded that when the economic land is more, then the marketed surplus becomes lower as because small holdings entrepreneurs concentrate more in the production phase. Marketed surplus has a positive relationship with the Education level. It

has been recorded that Marketed surplus has a positive relationship with electricity consumption also. Having a higher marketed surplus indicate more advancement and betterment in terms of entrepreneurial management and thus fuel use efficiency becomes more prominent and fuel consumption is reduced. It has been recorded that when the innovation proneness and market interaction is higher for the respondents, the marketed surplus is also higher.

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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