Effectiveness of Agro- Marketing in Odisha: An Empirical Study on the Relationship between Major Factors

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In an agro-based region like Odisha, when most of the developments are taking place related to maximizing the benefits to the stakeholders of rural places, the time has come to understand the underlying factors responsible for developing the framework of this process. There are various opinions related to make this development process visible, and at the same time providing scope to evaluate the outcomes. Amidst all these policies and strategic dimensions, the most eligible factors, i.e. the productivity of resources (mostly in terms of fertility factor) and the space utilized for the said purpose can be put on a measurement platform. The present study of ours makes an attempt to understand the underlying relationship between the use of these main variables of the land and productivity in regard to the agro-developmental processes.

***Keywords**: Cluster, cropping intensity, land, irrigated area, NCA*

Introduction

Odisha as a coastal state of India, has been mostly dependent on agro- products along with other industries for its development processes since long. There are several factors which have given rise to understand the progress of agro- marketing issues in Odisha, e.g. how to maximize the level of output from the available/ limited land and infrastructure. In addition, while studying the productivity factor which ultimately decides the scale of agro-success, the nature of the topography, the human factors etc. have got their own impact on the experiment as well. Coming to understand such a scenario, the relationship between farm size and productivity becomes one of the most vital debates in the Indian agricultural scenario and continues to attract the attention of the researchers even today. The schools of thought, differing in this important aspect of agro-status provide an insight to understand the scalability of agriculture by utilizing optimally the area of the farm. The origin of the problem can be bound to the ongoing food shortages, which

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India has been facing ever since a few eras. The second school addressed to the question of farm organization to achieve high level of productivity and competence through suitable land reforms. The present study of ours, based mostly on the primary data collected in the state of Odisha, makes an attempt to empirically establish the association between the scales of output measured vis-à-vis the area of land used for the purpose.

The Factors

There are three sets on finding the relationship between farm size and productivity that can be identified from the literature.

The first set [Sen (1962); Bhagawati and Chakravarthy (1969); Bharadwaj (1974); Reddy (1993), etc.] stated that the surveys were mostly based on farm management and cost of cultivation data, which supported the existence of an inverse relationship between farm size–productivity.

The second set [Chadha (1978); Rudra and Sen (1980); Bagai and Soni (1983), etc.] of the debate are associated with contradictory results, they used different data sets are analyzed the same with different statistical tool by integrating some new modifications, argued with the new agricultural technology, the inverse relationship either weakened or even has got reversed. They found a positive relation of farm size and productivity.

Opposing to both the sets, there are few studies (third set) that found no relationship between farm size and productivity. In addition to this, the advent of latest technologies and progressive policies related to agriculture and agro- marketing in India as well as in the state of Odisha has raised doubts related to any kind of substantial relationship existing between these two prime factors. However, various studies undertaken in this regard have come into a serious scanner because of the framework of study as well as the tools used for the purpose and so on. Still the importance of these variables has remained almost uninterrupted.

In overall, the literature evidences show though it is not a common phenomenon, output per unit of available land, labour and input intensity in production are inversely related to farm size, even when compensating for factors such as land quality and availability of irrigation, etc. In other words, it is said there exist an inverse relationship between farm size and agricultural production by using more labour and less capital and vice versa .Certain financial and non-financial factors have also gained importance in causing the difference in opinion, e.g. the wage factor in regard to the kind of labour (mostly taken from the family of labors), cannot be made compliant to the standard wage policy and so on. In addition, the market price offered for technical gadgets sometimes creates hindrance in the expected output of an available area of land.

Hypotheses

The studies in the literature have revealed that there exists an inverse relationship between farm size and agricultural production by using more labour and less capital and vice versa. That is, there is the presence of the inverse relationship between farm size and productivity. Therefore, to examine the present status, in this study, we shall test following hypothesis using cost of cultivation data.

- Farm Size and Land Productivity are inversely related.
- Farm Size and Cropping Intensity are inversely related.

Methodology

The main objective of the current study is to examine the effect of farm size on productivity, labour use, cropping intensity, the proportion of irrigated area, and other ancillary inputs. We use cost of cultivation data of Odisha to examine these hypotheses. The, information on 600 farm

households, distributed among 120 villages from 60 tehsils/sets, belonging to five zones is collected under the cost of cultivation scheme. As per Cost of Farming studies, 'Farm size' is well-defined as Land or Physical Area of the farmer. Average farm size is categories into five sets like below one hectors, one to two hectors, two to four hectors, four to six hectors and lastly six hectors and above. Here onwards, we explain the above hypothesis, showing the relationship between farm size and agricultural productivity with the help of linear and log linear equations.

Here, we tried both linear and log-linear functions, in which log-linear estimations are strong in many aspects in the analysis. We find that linear regression function is said to be more appropriate to find the inverse relationship between farm size and productivity, considering the intensity of irrigation along with the factors like regional and seasonal concepts.

The purposeful form used for the analysis is:

$$Y = \alpha + \beta_1 X_1$$

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2$$

The purposeful form used for the log-linear analysis is:

$$\log Y = \log \alpha + \beta_1 \log X_1$$

$$\log Y = \log \alpha + \beta_1 \log X_1 + \beta_2 X_2$$

Where Y is dependent variable, X_1 is farm size in hectares; and X_2 is the dummy variable (regional and seasonal factors) and are constant terms.

In the present sample, we find that there are rare farmers who do not implement HYV, nor use tractors and irrigate land. To find the relationship between factors influencing the adoption of technology with farm size OLS method found not beneficial. It is therefore necessary to use alternate statistical method to examine these relationships. After converting the dependent variable into (0, 1) dichotomous form the logistic regression can be used to examine the relationship between farm size and productivity.

If the dependent variable has only two possible values, for example 0 and 1, methods such as multiple regressions become worthless because predicted values of Y would not be unnatural to lies between 0 and 1. As the dependent variable is dichotomous the probability that the event will occur lies between 0 and 1 in logistic regression. Logistic regression has the additional advantage that all of the predictors can be binary, a mixture of categorical or continuous variable.

The logistic model is written as

$\log (p/1-p) = a + b \log X$

The left side of the equation is known, as the logit of the dependent variable is a transformation of the probability. The logistic equation can be further written as:

Log [Prob. (Event)/Prob. (No event)] = $b_0+b_1X_1+b_2X_2+\ldots+bpXp$

The above log linear equation shows same multiple regressions, but it shows each one unit change in log-independent variables is associated with a change in log- dependent variable.

There is a non-linear relationship exist between p and its logit.

Empirical Verification

Land use

The most vital of the issues discussed in the literature was the question of the relationship between farm size and productivity per unit of land. A series of studies, based on different data sources in various parts of India claimed to find an inverse relationship between farm size and productivity; the larger the farm size, is the smaller amount produced per unit of land and vice

versa. Although the results varied in comparability and significance, on the whole, the statistical evidence favored the negative relationship hypothesis.

In this study, we analysis between farm size and agricultural productivity, individually with eight different log linear equations. The initial four log linear equations estimate the value of gross cropped area production as the dependent variable. The last four log linear equation considers net cropped area production as the dependent variable.

Table- I: Farm size and value of agricultural production

Farm Size of Production (Equation number)	Dependent Variable	Constant	Farm Size	R^2
1	Log- Production/GCA	9.44 (208.23)	8.71 (2.39)	.01
2	Log- Production/ GCAt	9.83 (50.98)	0.13* (4.48)	.45
3	Log- Production/ GCAz	9.67 (147.53)	0.11 * (2.89)	.09
4	Log- Production/ GCAs	9.63(80.44)	8.52 (2.33)	.04
5	Log- Production/NSA	9.51 (78.75)	-0.24 (-2.51)	.01
6	Log- Production/NSAt	9.05 (16.31)	-0.19 (-2.36)	.35
7	Log- Production/NSAz	9.81(54.75)	-0.22 (-2.34)	.05
8	Log- Production/NSAs	10.96 (34.99)	-0.31* (-3.28)	.07

Note: a) Figures in parentheses are t-values. b) (*) -Statistically significant at 5% level. c) Equations with superscript't, z, and s' refers to estimations done with tehsils, zones and seasonal dummies respectively.

The analysis of the study is explained as shown in the above table. In first four equations where we take a gross crop area, we find a positive relationship between farm size and agricultural productivity. This outcome contradicts the hypothesis. We expected negative relationship but found a positive relationship between farm size and agricultural productivity. When productivity is defined as a ratio of the total value of production and gross cropped area, the impact of multiple cropping is eliminated in the above state. Again from the above table it also reflects that in case of log-production of gross cropped area whether we are using a dummy or using in case of zones, tehsils., and seasonal dummies in all cases there exist a positive relationship between log production and farm size. Whereas, again from the above table it also reflects that in case of log-production of net cropped area whether we are using a dummy or using in case of zones, tehsils., and seasonal dummies in all cases there exist a negative relationship between log production and farm size

The interesting point is that he found the negative relation for individual crop and we found it for total production. Cropping Intensity is well-defined as a ratio of gross cropped area of land holding in proportions. One would imagine an adverse association between farm size and productivity. This has also been originated by many researchers, the observed signal showed a tendency of cropping intensity to vary contrariwise with the farm size, regardless of level of irrigation and disintegration of land holdings. That is, small farmers cultivate more number of crops compared to large farmers in various parts of India.

Table-II: Farm Size with Cropping Intensity

Equation number	Dependent Variable	Constant	Farm Size	R^2
1	Log-Cropping Intensity	4.79 (125.85)	-.21* (-6.69)	.07
2	Log-Cropping Intensityt	4.41 (26.87)	-.20* (-8.11)	.46
3	Log-Cropping Intensityz	5.11 (94.39)	-.19* (-6.78)	.18
4	Log-Cropping Intensitys	5.61 (66.04)	-.26* (-9.95)	.36

Note: a) Figures in parentheses are t-values. b) (*) -Statistically significant at 5% level. c) Equations with superscripts', z, and s' refers to estimations done with tehsils, zones and seasonal dummies respectively.

From the above table we observe that there exists a negative relationship between log-cropping intensity in the case of using without dummy, and using dummy for tehsil, zonal and seasonal factor cases. The explanations put forward by us for the inverse relationship between cropping intensity and farm size, is due to the labour intensity differences that is, more intensive use of family labour and total labour used. These findings are statistically substantial and strong. This implies that the prospect charge of household labour is less than the market wage rate due to occurrence of mass joblessness and surplus labour in agriculture, as magnitude small farms will hire family labour more helpful.

Irrigation plays an important role in crop cultivation. Given the partial opportunities for bringing additional field of fallow lands under cultivation, it is generally observed that irrigation is capable of playing a useful role in agricultural production. The nature plays an important role in the availability of water for agricultural production. It expands the relative economic position of the farming public and makes drive of growth and productivity. The proportion of irrigated area has the probable for higher cropping intensity and rise in the total value of farms agricultural production.

Table -III: Cropping Intensity with Production in Irrigated Area (PIA)

Equation number	Dependent Variable	Constant	PIA	R^2
1	Log-Cropping Intensity	4.41 (180.84)	-.54 (-17.10)	.33
2	Log-Cropping Intensityt	5.06 (37.02)	-.58 (-18.75)	.64
3	Log-Cropping Intensityz	4.72 (112.52)	-.53 (-17.53)	.42
4	Log-Cropping Intensitys	4.95 (61.19)	-.43 (-13.49)	.43

Note: a) Figures in parentheses are t-values. b) (*) -Statistically significant at 5% level. c) Equations with superscript‘t, z, and s, refers to estimations done with tehsils, zones and seasonal dummies respectively.

It is observed from the above table that there exist an inverse relationship between log-cropping intensity in the case of tehsils, zones and seasonal dummies respectively. As observed from the above outcomes, the intensity of cropping is indirectly related to proportion of area under irrigated, which is statistically significant. The coefficient witnessed is –0.54 when the estimation is done without considering for regional and seasonal factors. A similar observation undergoes even after inclusion of regional and seasonal dummy variables in the estimation. The coefficients are shows statistically significant. This implies cropping intensity is a little low and the agricultural proportion of the irrigated area is higher on large farm, compared to that of the small farm.

Due to different type of irrigations pattern and cropping pattern significant negative relationship between cropping intensity and agricultural production in irrigated area particularly paddy production. Even though in irrigated area the farmers unable to find profit in case of multiple cropping pattern, because of costly labour input where as in case of small farmer it is profitable because the cost of family labour is almost zero. For that reason the large farmer leaves their available land after the first crop remain idle.

Conclusion

The expenses or the capital deployed for the success of agro-marketing efforts need to be analyzed experimentally to understand the intrinsic variables affecting the process. With the prime objective of understanding the nature of these factors, the current study makes an attempt to explore the prime variables taken from past studies and with the help of analytical tools to establish an empirical relationship between these two, viz. The area of the farm related to the output capacity of the same. As we found out from the earlier ones, lands having small area could yield higher productivity because of possibility of utilizing the available resources (labour, capital etc.) in a reasonably less extent. This paradoxical conclusion prompted the current study to understand the reverse relationship in a better way by using the log-linear estimation vis-à-vis the functions both linear and non-linear. As can be seen, the outputs of the study also generated the fact that area of the firm and extent of output is inversely proportional. This also brought out certain other factors related to human resources, mostly labour, and its substantial utilization in small sized firms. In addition to that, it can also be concluded that the weather factor, i.e. the smaller sized firms hardly consider crops for higher durability rather they intend to cultivate those crops which can be instantaneously cultivated and produced for a short-time or so as to say timely commercial return. On the other side, the larger firms can be considered to yield outputs mostly depending on a durability factor (however facilitated by certain supportive factors like irrigation, government assistance, etc.), i.e. to cater to a market in the long run and striving for returns consistently as well.

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