



Research Paper

Production efficiency of smallholder farmers in different cropping patterns: evidence from Dhubri district of Assam:

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Abstract:

In Assam more than 85% of total farmers are small and marginal. They have less land and other resources. Efficient utilization of the existing resources is very important. In this study technical efficiency of small and marginal farmer is determined using DEA technique. Small and marginal farmers are moderately efficient and they are more efficient in sole cropping than multiple cropping.

Key words: efficiency, small and marginal farmer, DEA, sole cropping and multiple cropping.

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I. Introduction:

Smallholder farmers are vital for India's agricultural and rural economy. Smallholder farmers are defined as those marginal and sub marginal farm households that own or cultivate less than two hectare of land. Increase in population, subdivision and fragmentation of landholdings due to breakdown of joint family system convert farmers into small and marginal categories. In India small and marginal farmers cultivate around 44% of the area and they produce around 60% of the total food grains production and over half of the country's fruits and vegetables production. In Assam also more than 85% of total farmers are small and marginal and they contribute largely in agricultural sector of Assam. Increasing percentage of small and marginal farmers shows that future of the Indian agriculture based on small and marginal farmers. In spite of increasing and substantial contribution to the national food supply and to agricultural GDP small holder farmers constitute more than half of the nation's total poor. Since small and marginal farmers have less land and also financially weak, efficient utilization of their existing resources is very important.

II. Review Of Literature

A study on efficiency in agriculture in West Bengal reveals that farmers are moderately efficient in use of inputs. (Laha and Kuri, 2011). Another study on efficiency in wetland agriculture in Meghalaya shows that farmers are inefficient in use of resources like land, irrigation, fertilizers and over utilized some other resources (Ishlam and Kalita, 2014). A study on technical efficiency in India indicates that technical efficiency is the highest in hill and mountainous region and lowest in rain fed areas (Suresh, 2015). Another study on agricultural technical efficiency shows that there exists ample scope to increase technical efficiency with the existing resources. Proper training can help in reducing input cost (Wang et.al, 2017). Farmers of Ethiopia are less productive in agriculture because they have lack of knowledge in use of inputs efficiently (Yohannis, et.al, 2020). A study in Nigeria shows that, farmers who adopt sole cropping have higher technical efficiency (Ajibefun, 2006). In contrast to this study, another study on efficiency says that sole cropping is less efficient than multiple cropping (Kansiime,et.al, 2018). A study in Barak valley of Assam shows that there exists scope to increase production of agriculture with the existing resources (Hussein, 2015).

Objective:

Main objective in this study is to examine the production efficiency of smallholder farmers in different cropping patterns.

III. Methodology:

This study is based on both primary and secondary data.

Data source:

Secondary data:

1. Agricultural census of Assam 2011
2. District census handbook, 2011

Primary data:

Primary data are collected through personal interview with the farmers of selected area using pre tested questionnaire.

Sampling design:

District selection	Dhubri (highest decline in operated area in 2010-11 agricultural census compared to 2005-06 agricultural census of Assam and average yield of total food grains is the highest.
Block selection (based on number of farmers)	Birshingjarua (highest number of farmers in this block out of the district.
Village selection (Random selection)	Jharner char pt 1 (randomly)
	Machipara pt 1 (randomly)
	Dimatala pt 2 (randomly)

Total number of farmers in this three villages are (468+149+322) 939. Since method of cultivation is similar for all the farmers 10% of total farmers are taken as sample and thus the total sample is 94.

Line of analysis:

Data Envelopment Analysis is used in this study. Data envelopment analysis is a mathematical technique that determines efficiency of decision making units using multiple inputs and outputs through linear programming technique. Decision making units means the entity under investigation. In this case decision making units are farm. There are mainly two methods for efficiency estimation. One is stochastic frontier approach and another is data envelopment analysis. In this study data envelopment analysis is used since it can handle multiple inputs and outputs and no need for a prior assumption of functional relationship of inputs and outputs like stochastic frontier approach. So data envelopment analysis is called non-parametric approach. Data envelopment analysis may be input oriented or output oriented. In input oriented DEA efficiency frontier is reached through reducing inputs and in output oriented DEA tried to maximize output. Again efficiency score can be estimated under constant and variable returns to scale which is also known as overall and pure technical efficiency respectively.

In this study for estimation of efficiency score, land (in hectare), labour (in man days) and material cost (Rs. Per farmer per year) are inputs and money value of all the goods produced by the farmers is output. Efficiency score both in case of constant and variable returns to scale and scale efficiency is estimated.

IV. Result And Discussion:

Three types of cropping patterns are found among the farmers in the study area.

1. Rice
2. Rice-vegetables-others
3. Rice-others

Other crops include mustard. Maize, jute, wheat and sugarcane.

Technical efficiency analysis of smallholder farmers in crop production:

Table1

	Rice	Rice-vegetables-others	Rice-others
OTE	0.83	0.79	0.6
PTE	0.88	0.85	0.75
SE	0.75	0.92	0.79

Source: survey data

OTE- Overall technical efficiency, PTE- pure technical efficiency, SE- Scale efficiency

From table 1, it is found that farmers are 60%-88% efficient; i.e. they have scope to increase output with the existing resources and technology. Out of three cropping patterns, more efficiency score is found in rice cultivation. It implies that farmers can use resources more efficiently in only rice cultivation. This may be due to farmers are becoming more expertise if they cultivate a particular crop year after year. In case of scale efficiency score, farmers have efficiency score 0.75-0.92. This means farmers are not produce crops at optimum scale; they can increase or decrease size of production. Scale efficiency highest in rice-vegetables and other crops cultivation and lowest in rice cultivation.

Distribution of efficiency score:

Efficiency score	rice		Rice-vegetables-others		Rice-others	
0.4-<0.5	0	0	0	0	5	25
0.5-<0.6	4	8			1	5
0.6-<0.7	5	10	2	8.3	1	5
0.7-<0.8	3	6	5	20.8	3	15
0.8-<0.9	7	14	8	33.3	3	15
0.9-<1	12	24	5	20.8	2	10
E=1	19	38	4	16.7	5	25

Source: survey data

In rice cultivation most of the farmers have efficiency score between 0.9-1, in rice-vegetables-other crop cultivation most of the farmers have efficiency score 0.8-0.9 and in rice-other crop cultivation 25% farmers have efficiency scores between 0.4-0.5 and 25% have efficiency score between 0.9-1.

V. Conclusion:

From the whole analysis it is found that, in terms of efficiency farmers are not in bad position. Even then there exists scope to increase output with their existing resources. Since smallholder farmers have very less land and financially also weak, efficient utilization of existing resources is very important. So research on which factors affect efficiency of the farmers can help to take necessary step to the policy makers for improving efficiency of the farmers.

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