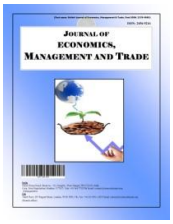

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Economic Analysis of Women Self Help Groups Generating Dairy Activity

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

In India, the majority of the people live in a rural area and are engaged in agriculture, earning a subsistence wage. Women are a vital part of the Indian economy and employment to build their empowerment. Provision of loans and financial services to the poor is an important aspect of the development agenda of any economy. To ascertain the technical efficient self-help groups and identify the possible determinants of technical efficiency of dairy self-help groups. This study was undertaken in rural areas of Amravati division and for this study Selected those self-help groups which were engaged in agriculture-based activity dairy. To analyse the objectives of the study to ascertain the technical efficient self-help groups and identify the possible determinant of technical efficiency of dairy self-help groups, the primary data was collected with the help of Personal interview of self-help groups. The marginal value of productivity of assets determined to decrease the use of assets and scope to be increasing this variable. The variable asset executed negative significant contribution in determining the gross loan its indicates declining assets affects to the loan refund and hence its indicated limited the size of SHGs, in views of this it is necessary to increase the assets which will make the SHGs to increase their activities production which helps in increase gross returns to refund possible therefore assets is the possible determinant of gross loan portfolio. The average technical efficiency for the entire sample of dairy SHGs was 0.9771,

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allocative efficiency was 0.5843 and 0.5671 dairy SHGs economic efficiency. The variables such as Cost per borrower, Assets, Borrow per member, Net return and Subsidy contributes to the explanation of the variation in Economic Efficiency of the dairy SHGs.

Keywords: Self-help groups; technical efficiency; gross loan; subsidy; returns.

1. INTRODUCTION

Women are a vital part of the Indian economy and employment to build their empowerment. All-round development of women has been one of the focal points of the planning process in India. The provision of loans and financial services to the poor is an important aspect of the development agenda of any economy. Upliftment of the poor by promoting self-employment and social security has for a long time been the concern of democratically elected Governments in countries like India. India has been able to develop its model of a microfinance organization in the form of savings and credit groups known as Self-Help-Groups (SHGs) which are bank linked. Rural women of India have been benefited by the Self Help Groups (SHG). The SHG can approach any bank for availing loan facility to undertake a suitable activity. The group loan is distributed among the members to run a small business [1]. The loan is repaid out of the profits earned. “Microfinance sector has grown rapidly over the past few decades. “Muhammad Yunus is a Bangladeshi social entrepreneur, banker, economist, and civil society leader who was awarded the Nobel Peace Prize for founding the Grameen Bank, Bangladesh in 1976 and pioneering the concepts of microcredit and microfinance”. Today it has evolved into a vibrant industry exhibiting a variety of business models. Microfinance programmes like the Self-Help Bank Linkage Programme in India have been increasingly hailed for their positive economic impact and the empowerment women. Self Help Groups (SHGs) are at the centre of the microfinance revolution that India has been witnessing over the past two decades. The SHG bank linkage programme is the flagship microfinance intervention of NABARD in the year 1992 with the policy support of the Reserve Bank of India. It mainstreamed the institution of SHG as an innovative system based on the principles of trust and mutual help that can effectively deliver affordable financial services to households with low net worth [2].

Self-help groups of poor people in the rural area of Amravati division established under District Rural Development Agency (DRDA), Mahila Arthic Vikas Mahamandal (MAVIM), NABFINS-NGOs, Krishi Vigyan Kendra, SHGs are engaged under economic activities or income-generating activities. Steps would be taken by the government very soon in strengthening the SHGs and achievement in different fields in the rural area of the division [3]. Small-scale milk processing enterprises could be established in villages where there is a surplus of milk. Women of the SHGs in study area involved in Income Generating Activity dairy to yield their income [4,5]. The present paper was planned to study the technical efficiency of Income Generating Activity dairy of women Self Help Groups of Amravati division.

The *study* has revealed several features such as income generating SHGs for improving their income, savings and efficient flow of SHGs credit [6], utilization *of credit* for *income-generating activities*, excellent *loan* repayment and *improved empowerment of SHG members* [7,8]. The study helped to improve SHGs members empowerment and hence getting ideas about best efficient SHGs and their possible determinants [9].

2. MATERIALS AND METHODS

The study on Technical efficiency of Self Help Groups generating agriculture dairy activity in Amravati division of Maharashtra was undertaken with the following objectives.

-To ascertain the technical efficient self-help groups and identify the possible determinants of technical efficiency of dairy self-help groups.

This study was undertaken in rural areas of Amravati division and for this study Selected those self-help groups which were engaged in agriculture-based activity dairy. The following five districts were selected for the study, namely Amravati, Akola, Washim, Buldhana and Yavatmal.

The data needed for the study was collected from SHGs members by personal interview method using pre-tested schedule for the purpose in the year 2015 to 17. For these study Selected those self help groups which were

engaged in agriculture-based activity dairy, total of 50 women SHGS has been selected and there 10 years existent in five districts of Amravati division for economic analysis to analyse the technical efficiency, with respect to purpose wise relating to portfolio lending by SHG's providers, utilization pattern of borrowed funds by the Self help groups, loan availed and repayment, rate of interest, service charges and other costs involved in borrowings, cost and returns involved in each activity elected groups efficiency and identified the determinants of variations in efficiencies among SHGs.

2.1 Analysis of Data

To fulfil the specific objectives of the study, the data generated were subjected to statistical analysis using the following analytical tools and techniques.

To ascertain the technical efficient self-help groups and identify the possible determinant of technical efficiency of self-help groups. Stochastic Frontier Model was employed.

2.2 Stochastic Frontier Approach

Output oriented technical efficiency shows the firms ability to obtain maximum output from a given amount of inputs. Technical inefficiency affects allocative efficiency and a negative cumulative effect on economic efficiency operates. Hence the concept of technical efficiency is important for the better performance of the economic units [10]. Technical efficiency is measured by the distance a particular firm is from the production frontier. A firm that sits on the production frontier is said to be technically efficient. The concept of technical efficiency is important to firms because their profit depends highly upon their value of technical efficiency [3,11].

Is a method of economic modelling has its starting point in the stochastic production frontier models simultaneously introduced by [12] (Meeusen and Van den Broeck, 1977). Is a method of economic modelling. It has its starting point in the stochastic production frontier models simultaneously introduced by Aigner et al. [12] (Meeusen and Van den Broeck1977).

The production frontier model without random component can be written as:

$$y_i = f(x_i;\beta)\cdot TE_i$$

Where,

y_i is the observed scalar output of the producer i, $i=1,..I$, x_i is a vector of N inputs used by the producer i, $f(x_i, \beta)$ is the production frontier, and β is a vector of technology parameters to be estimated.

TE_i denotes the technical efficiency defined as the ratio of observed output to maximum feasible output. A stochastic component that describes random variables affecting the production process is added. The stochastic production frontier will become:

$$y_i = f(x_i;\beta)\cdot TE_i \cdot \exp\{v_i\}$$

We assume that TE_i is also a stochastic variable, with a specific distribution function, common to all producers.

We can also write it as an exponential

$$TE_i = \exp\{-u_i\},$$

Where,

$u_i \geq 0$, since we required $TE_i \leq 1$.

Thus, we obtain the following equation:

$$y_i = f(x_i;\beta)\cdot \exp\{-u_i\}\cdot \exp\{v_i\}$$

The technical efficiency of i^{th} firm at t^{th} period is given by

$TE_{it} = exp\ (-U_{it}) = exp\ (-\ zit\ \delta - W_{it})$

Now, if we also assume that $f(x_i, \beta)$ takes the log-linear Cobb-Douglas form, the model can be written as:

$$\ln y_i = \beta_0 + \sum_n \beta_n \ln x_{ni} + v_i - u_i$$

We have followed Battese and Corra (1977) specification for variance parameters

$\Sigma s^2 = \sigma v^2 + \sigma^2$
$\gamma = \sigma^2 / \sigma s^2$

The value of γ lies between 0 and 1. Zero value of γ shows that the variance of the efficiency effects is zero and deviations from the frontier are entirely due to noise.

Value *γ = 1* indicates that all deviations are due to technical efficiency.

For the output variable, we have taken the gross loan portfolio (measured in Rupees). Cost per borrower (CPB), assets, borrow per member, net returns and subsidy are taken as input variables. All variable was measured in rupees.

2.3 Specification of Model

2.3.1 Stochastic frontier model of technical efficiency are given below

$$\ln GLP_{it} = \beta_o + \beta_1 LCPB_{it} + \beta_2 LASSET_{it} + \beta_3 LBPM_{it} + \beta_4 LNR_{it} + \beta_5 LSUB_{it} + V_{it} - U_{it} \quad (1)$$

Where,

Ln natural logarithm (i.e. logarithm to the base e).

GLP_{it} represents all outstanding principals due for all outstanding members loans of i^{th} SHGs at time period t.

$LCPB_{it}$ represents logarithm of cost per borrower (operating expense/ Number of active borrowers) measured in Rupees of i^{th} SHGs at time period t.

$LASSETS_{it}$ represents logarithm of the total of all net asset account of the i^{th} SHGs at t^{th} period measured in Rupees

$LBPM_{it}$ represents logarithm of loan borrow per member of i^{th} SHGs at time period t. measured in Rupees

LNR_{it}represents logarithm of net returns of i^{th} SHGs at time period t measured in Rupees

$LSUB_{it}$ represents the logarithm of Subsidy taken by i^{th} SHGs at time period t, measured in Rupees
β_iParameters to be estimated

$V_{it}$are independent and identically random errors
U_{it} is non- negative random variables.

2.3.2 Allocative efficiency

Allocative efficiency refers to the ability and willingness of a firm to use these inputs optimally given the input prices. Allocative efficiency defined in terms of profit maximization, given the technology allocative efficiency refers to the achievement of optimum output so has to maximize a gross loan.

$$\text{Allocative efficiency} = GLP_0/GLP_E \quad (2)$$

GLP_0 =Observed maximum gross loan portfolio among all selected SHGs.

GLP_E =Estimated loan or potential gross loan portfolio at the level of input used by SHGs who obtained the maximum gross loan [13].

2.3.3 Economic efficiency

The measure of economic efficiency can be divided into two component *viz.,* technical efficiency, price or allocative efficiency. It is a combination of technical and allocative efficiency.

(EE=Technical efficiency × Allocative efficiency) (3)

2.3.4 Marginal valve productivity (MVP)

The MVP was computed by multiplying the coefficients of the given resources with the ratio of the geometric mean of the output to the geometric mean of a given resource, for example, the MVP of Xi would be

$$MVP\ (xi) = bi \frac{\overline{Y}\ (GM)}{\overline{Xi}\ (GM)}$$

Given,

GM = represents the geometric mean
MVP =Marginal value productivity
bi =is the corresponding elasticity of xi
Xi(GM) is the geometric mean of the i^{th} resources
$\overline{Y}$ (GM) is the computed value at the geometric mean

3. RESULTS AND DISCUSSION

3.1 Technical Efficiency of SHGs

Output oriented technical efficiency of SHGs shows the firms ability to obtain maximum output from a given amount of inputs use.

3.1.1 Technical efficiency of dairy SHGs

Marginal likelihood estimates of the parameters of the production frontier in Table 1 shows the elasticities of frontier gross loan portfolio concerning cost per borrower, assets, borrow per member, net return subsidy was estimated at the means of input variables to be 0.1588, 0.4048, 0.3974 and 0.2209, respectively.

Table 1. Maximum likelihood estimates of the stochastic frontier of dairy SHGs

Sr. no.	Explanatory variables	βi	Coefficient	St. error
1	Constant	β0	0.4542	0.2587
2	Log cost per borrower	β1	0.1584***	0.0460
3	Log assets	β2	-0.1327***	0.0296
4	Log borrow per member	β3	0.4048***	0.0580
5	Log net return	β4	0.3974***	0.0455
6	Log subsidy	β5	0.2209***	0.0456
	Log-likelihood	92.46		
		R^2	0.8854*	
		γ	0.7960	0.3836
		σ^2	0.0049	0.0093
Average Technical efficiency		0.9771		

**** significance at 1%, ** significance at 5%, * significance at 10%*

Given the specification of stochastic or Cobb Dougloulas frontier model results shows that the elasticity of mean value of gross loan is estimated to be an increasing function of cost per borrower, borrow per member, net return and a subsidy [14], all these variables positively significant contribution in the gross loan its indicates that these variables to help the loan refund [15].

Table 2 indicates Negative Marginal value of productivity of assets is to determine to decrease the use of assets and scope to increase this variable, the variable asset executed negative significant contribution in determining the gross loan its indicates decline assets affects the loan refund and hence the size of SHGs is limited [16,17], in views of this it is necessary to increase the assets which will make the SHGs to increase their activities production which helps in increase gross returns to refund possible therefore assets is the possible determinant of gross loan portfolio. The returns to scale parameters were found to be 1.04 implying increase in the input variables would result in more than proportionate in the gross loan of the dairy SHGs. The index of technical efficiency level for each individuals SHGs was the estimation of e-μ calculated by estimating one-sided error component μi [18,19].

Table 3 shows the efficiency distribution of dairy SHGs, indicates the minimum and maximum technical efficiency among selected SHGs. Technical efficiency of individual SHGs has been estimated, the results indicate the not more variations in technical efficiency 0.9-1 across the individual dairy SHGs.

The minimum technical efficiency in selected SHGs sample was 0.923(93.23%), while the maximum was 0.9905. The average technical efficiency for the entire sample of dairy SHGs was 0.9771 (97.71%) indicating 0.0229(2.29%) inefficiency it implies to there is scope to increase the gross loan portfolio. The allocative efficiency was 0.5843 (58.43%) which indicates the allocative inefficiency was 0.4203 (42.03%), from there is 42.03% scope to increasing of dairy SHGs loan borrowing. Allocative efficiency refers to the ability and willingness of a dairy activity to use this inputs optimally (58.43%) in a given input prices [20] and the 0.5671 (56.71%) meaning that the dairy SHGs were economically efficient and it found to 0.4329 (43.29%) economically inefficient dairy SHGS indicating which have scope to improve the economic efficiency [21,22]. The variables Cost per borrower, Assets, Borrow per member,

Table 2. Marginal value productivity of the variables

Sr. no.	Variables	MVP
1	Cost per borrower	0.00386
2	Assets	-0.5776
3	Borrow per member	4.6669
4	Net return	0.4255
5	Subsidy	0.5069

Table 3. Efficiency distribution of dairy SHGs

Efficiencies	Efficiency level
Technical efficiency	0.9771
Allocative efficiency	0.5843
Economic efficiency	0.5671
Maximum Technical efficiency among selected SHGs	0.9905
Minimum Technical efficiency among selected SHGs	0.923

Table 4. Frequency distribution of selected sample efficiency of SHGs dairy activities

Sr. no.	Efficiency index	No of SHGs		
		Technical efficiency	Allocative efficiency	Economic efficiency
1	0.15-0.20	-	1	1
2	0.20-0.25	-	-	-
3	0.25-0.30	-	2	2
4	0.30-0.35	-	-	-
5	0.35-0.40	-	1	1
6	0.40-0.45	-	-	2
7	0.45-0.50	-	2	12
8	0.50-0.55	-	13	3
9	0.55-0.60	-	3	1
10	0.60-0.65	-	23	23
11	0.65-0.70	-	1	1
12	0.70-0.75	-		1
13	0.75-0.80	-	1	1
14	0.80-0.85	-	2	1
15	0.85-0.90	-	-	-
16	0.90-0.95	2		
17	0.95-1.00	48	1	1

Net return and Subsidy contribute to the explanation of the variations in EE of the dairy SHGs [23,14].

Frequency distribution of selected sample efficiency of SHGs dairy activities was presented in Table 4 technical efficiency from all 50 SHGs majority of 48 SHGs ranges between 0.95-1 efficiency level and only 2 SHGs ranges 0.90-0.95, higher technical efficiencies in all dairy SHGs because the low cost of borrowing of loan and fewer variations in technical efficiency estimates indicating the majority of SHGs use their resources efficiently in SHGs loan process. In allocative efficiencies majority 23 of SHGs ranges between 0.60-0.65.followed by 13 SHGs which ranges between 0.50-0.55, 3 SHGs ranges between 0.55-0.60, 2 SHGs allocative efficiency from each range 0.25-30, 0.30-0.35 and 0.80-0.85 and 1 SHGs allocative efficiency from each range 0.15-0.20, 0.35-0.40,0.65-0.70, 0.75-0.80, 0.95-1.00, respectively, scope to improve allocation of resources of dairy SHGs. With regards to economic efficiencies majority 23 of SHGs ranges between 0.60-0.65.followed by 12 SHGs ranges between 0.45-0.50, 3 SHGs ranges between 0.50-0.55, 2 SHGs economic efficiency from each range 0.25-30, 0.40-0.45 and 1 SHGs economic efficiency from each range 0.15-0.20, 0.35-0.40, 0.55-0.60, 0.65-0.70,0.70-0.75, 0.75-0.8,0.80-0.85, 0.95-1.00, respectively, wide variations in economic efficiency is indications to SHGs scope to improve economic efficiency of dairy SHGs [24].

4. CONCLUSION

1. Marginal value of productivity of assets is to determine to decrease the use of assets and scope to increase this variable, the variable asset executed negative significant contribution in determining the gross loan its indicates decline assets affects the loan refund and hence the size of SHGs is limited, in views of this it is necessary to increase the assets which will make the SHGs to increase their activities production which helps in increase gross returns to refund possible therefore assets is the possible determinant of gross loan portfolio.
2. The returns to scale parameters were found to be 1.04 implying increase in the input variables would result in more than proportionate in the gross loan of the dairy SHGs.
3. The average technical efficiency for an entire sample of dairy SHGs was 0.9771 (97.71%) indicating 0.0229 (2.29%) inefficiency it implies to there is scope to increase the gross loan portfolio. The allocative efficiency was 0.5843 which indicates the allocative inefficiency was 0.4203 (42.03%), it can be from that there is scope for 42.03% scope to increasing of dairy SHGs loan and the 0.5671 (56.71%) was economic efficiency and it found to 0.4329 (43.29%) economically inefficient dairy SHGs indicating which have scope to improve the economic efficiency.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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