

Original Research Article

Efficiency Analysis of Wheat Farmers of District Layyah of Pakistan

ABSTRACT

Like many other developing countries, Pakistan has lower agricultural productivity. It is due to the reason that the farming community is almost illiterate and, has traditional and conservative farming practices. Adoption and diffusion of new technology at farm level is hindered due to these factors. This study aimed at estimating; technical, allocative and economic efficiency. The determinants of inefficiency for the wheat farms in district Layyah were also quantified. Data of 120 farmers for the crop year 2010-11 were used for the analysis purpose. A non-parametric approach, 'Data Envelopment Analysis (DEA)' was used to find out the efficiency scores. Separate regression was used for these inefficiency scores for socio-economic and farm specific variables by using a Tobit regression model. The results showed that mean technical, allocative and economic efficiency of farms in the sample area was 84, 81 and 68 percent, respectively. Results of Tobit regression models showed that impact of years of schooling, access to credit, number of contacts with extension agents, and distance of farm from main road were negative and significantly affecting technical inefficiency of wheat farms. The farm size variable sign was negative and had significant impact on the allocatively inefficiency. The coefficient of access to credit dummy variable was positive and had significant impact on allocative inefficiency. The coefficient of distance from main road was negative and significant which implied that as the distance of farm from main road increased the economic inefficiency will decreases. Quantified results urged the need of improvement in the agri-extension services, timely and proper availability of inputs, and establishment of local level markets at lower administrative units (like, town or union council) for the improvement of existing farming system.

Key words: Wheat, Efficiency, Data Envelopment Analysis, Tobit Regression, Layyah

1. Introduction

Like other developing countries agriculture in Pakistan is a dominant driving force for country's growth. It provides directly/indirectly sustenance to 43.5 percent of county's population living in rural areas. It contributes 20.9 percent to national GDP and employs 43.4 percent of the total labour force. This sector provides raw material to the industrial sector and is an important market for industrial products. Wheat is the leading food grain of Pakistan occupying the largest area

under single crop. Wheat contributes 10 percent to the value added in agriculture and 2.1 percent to GDP. Area under wheat has decreased to 9180 thousand hectares in 2014-15 from last year's area of 9199 thousand hectares which shows a decrease of 0.2 percent. The production of wheat stood at 25.478 million tonnes during 2014-15, showing a decrease of 1.9 percent over the last year's production of 25.979 million tonnes [1].

Agricultural productivity is low in most of the developing countries including Pakistan. Moreover, slow and meandering agricultural growth is unable to keep pace with the fast and persistently growing population pressure in these countries. That in turn, has, continued to result in malnutrition and recurrent famines [2]. Worse than this are the results of ILO [3], which has shown that food consumption inequalities have actually increased overtime not only in the food deficit countries but also in countries experiencing rapid agricultural growth. This point to the ever-hanging shadows of food deficiency and resulting malnutrition over the countries characterized by slow or negative growth in per capita food production and perverted income distribution [2]. The only choice with these countries is to enhance food production and provide better access to food consumption for the poor masses [4].

Despite serious efforts made by the wheat breeders in developing new high yielding varieties during the past three decades, wheat production in Pakistan remained short of demand and thus import has been the only alternative to fill the gap. The present wheat requirement of the country is more than 20 million tons. It has been estimated that by the year 2020 wheat import would rise up to 15 million tons costing 2 billion US dollars [5]. The situation could worsen further if Pakistan fails to achieve a higher level of growth rate in wheat production and sustain it. Under the present wheat production system and productivity scenario the realization of this objective appears to be highly unlikely [6, 7].

The World Food Council has found out that the rate of food consumption is faster than that of its production that is why availability of food on per capita basis has been declining each year [8]. Over greater period of Pakistan's existence, wheat has been imported to meet the minimum food need of the country. Food deficits at times averaged 10-15 % of the wheat requirement. Wheat imports in some years went over 2 million tons. In the current year, wheat deficit has further widened. For the year 2022, wheat production has been projected at 23.71 million tons and wheat requirement at 28.92 million tons, showing a deficit of 5.2 million tons [9]. This, amongst others, is due to the faster growth rate of human population which is squeezing land and water

availability on per capita basis. Other disquieting factors in food sufficiency are rapidly deteriorating state of ground water and land quality. The fact is that due to significant constraints, future expansion of both land and water resources are rather impossible [10]. Ahmad [11] showed negative trend in efficiency in the main cropping zones of cotton, mixed cropping zone and rice zone (which constitute about 70% of the crop wealth of Pakistan), due to land degradation caused by the existing nutrient exhaustive cropping patterns, increasing incidence of water logging and salinity, the use of brackish underground water and insects and diseases. Low yields in Pakistan are mainly due to physiological, agronomic, socio-economic, political factors and poor resource management. Poor management is more conspicuous of all factors, particularly in terms of input use. That is why irrigated wheat per hectare varies from 0.5 tons to 5.5 tons [12].

The above discussion brings out that source of additional wheat production is by way of improvement in wheat productivity. The planned study was oriented towards the goal of achieving higher productivity by improving technical efficiency of wheat farmers. The study focused on estimating the technical, allocative and economic efficiency of wheat farmers in the study area. Impact of socio-economic and farm specific factors on technical, allocative and economic inefficiency of farms were also assessed.

2. Research Methodology

2.1 Data Collection Procedure

The planned study was conducted in district Layyah. One representative Tehsil was selected for study purpose. In order to collect data stratified random sampling technique was used. Six villages were taken from the selected Tehsil. All randomly selected villages were situated at different distances and directions from the market. A well designed and pretested questionnaire was drafted to get relevant information regarding various farm specific variables. Twenty five farmers were selected from each village represented by small, medium and large farmers in proportion to their number in the village. A sample of 120 farmers was taken as total. Data was collected for the crop year 2010-11.

2.2 Empirical Models

Efficiency is an important economic concept and is used to measure the economic performance of a production unit. Frontier production function is that it gives the maximum output from a

given level of inputs, given the current state of technology in an industry. Farrell [13] referred frontier as the best practice frontier. The best practice frontier is used as a standard against which the efficiency of a firm is measured. The purpose of frontier production function approach is to estimate a frontier rather than an average production function. Since Farrell's original work in 1957, frontier methodology has been extensively used in applied production analysis.

2.2.1 Estimation of Technical Efficiency

Technical efficiency scores obtained from constant returns to scale DEA model is called total technical efficiency and from variable returns to scale DEA model as pure technical efficiency.

2.2.2 Variable Returns to Scale DEA Model

Coelli, [14] suggests that constant returns to scale DEA model is only appropriated when all firms are operating at optimal scale but it is not possible in agriculture due to many constrains. The use of constant return to scale DEA model when all firms are not operating at optimal scale results in measures of technical efficiencies that are confounded by scale efficiencies. In order to avoid this problem, Bankers, [15] modified constant returns to scale DEA model to variable returns to scale model by adding convexity constraints. The use of variable returns to scale DEA model allows the calculation of technical efficiency free from the effects of scale efficiencies. The envelopment form of the input-oriented variable returns to scale DEA model is specified as follows:

$$\begin{aligned} & \text{Min}_{\theta, \lambda} \theta, \\ & \text{subject to} \\ & -y_i + Y\lambda \geq 0 \\ & \theta x_i - X\lambda \geq 0 \\ & N1' \lambda = 1 \\ & \lambda \geq 0 \end{aligned}$$

Where:

Y represent output matrix for N farms.

θ represents the total technical efficiency of i^{th} farm.

λ represents $N \times 1$ constants.

X represent input matrix for N farms.

y_i represents the total farm income of the i^{th} farm in Rs.

x_i represents the input vector of $x_{1i}, x_{2i}, \dots, x_{7i}$ inputs of i^{th} farm.

X_{1i} represents the total cropped area in acres on the i^{th} farm.

X_{2i} represents the total quantity of seed in kg used on the i^{th} farm.

X_{3i} shows the total number of tractor hours used for all farm operations including ploughing, planking, ridging, hoeing, fertilizing, spraying, land leveling etc. on the i^{th} farm.

X_{4i} represents NPK nutrients (kg) used on the i^{th} farm. It was observed that few farmers in the sample area also used farmyard manure. It is, therefore, more plausible to determine the quantity of NPK present in farmyard manure. These nutrients were calculated on the basis of chemical composition given by Brady [16].

X_{5i} indicates the labour input consisting of family and hired labour and was calculated as the total number of man-days required to perform various farming operations on the i^{th} farm.

X_{6i} represents the active ingredients used on the i^{th} farm.

X_{7i} represents the irrigation hours for i^{th} farm

2.2.3 Estimation of Economic Efficiency

Economic efficiency is estimated by dividing minimum cost by observed cost. Cost minimization DEA model is used for the estimation of cost minimizing vector of input quantities.

Cost minimization DEA model is specified as follows:

$$\text{Min}_{\lambda, x_i^E} w_i x_i^E$$

subject to

$$-y_i + Y \lambda \geq 0$$

$$x_i^E - X \lambda \geq 0$$

$$N1' \lambda = 1$$

$$\lambda \geq 0$$

Where:

w_i is vector of input price $w_{1i}, w_{2i}, \dots, w_{7i}$ of the i^{th} farm.

x_i^E is the cost minimizing vector of input quantities for the i^{th} firm.

N refers to total number of farms in the sample.

155 W_{1i} represents land rent of i^{th} farm in Rs.

156 W_{2i} represent total cost of seed used on the i^{th} farm in Rs.

157 W_{3i} represents total amount paid for the use of plough on the i^{th} farm in Rs.

158 W_{4i} represents total cost of NPK used on the i^{th} farm in Rs.

159 W_{5i} represents total cost of labour used on the i^{th} farm in Rs.

160 W_{6i} represents total cost of pesticides/weedicide used on the i^{th} farm in Rs.

161 W_{7i} represents total cost of irrigation water used on the i^{th} farm in Rs.

162
$$\text{Economic Efficiency} = \text{minimum cost/observed cost}$$

163
$$EE = w_i x_i^E / w_i x_i$$

164 **2.2.4 Estimation of Allocative Efficiency**

165 Allocative efficiency is the ratio of economic efficiency to technical efficiency and can be
166 calculated residually as:

167
$$\text{Allocative Efficiency} = \text{Economic Efficiency} / \text{Technical Efficiency}$$

168
$$AE = EE / TE$$

169 Technical, allocative and economic efficiency scores in this study was estimated by using the
170 computer software *DEAP 2.1* as described in Coelli [17].

171 **2.2.5 Tobit Regression Model**

172 In order to estimate the sources of technical, allocative and economic inefficiency of farms,
173 various socio economic and farm specific variables were regressed on inefficiency estimates of
174 farms using Tobit regression model.

175 According to Bukhsh [18], a range of factors like distinctiveness of farms, management,
176 physical, institutional and environmental aspects could be the cause of inefficiencies in the
177 production process of the farmers. These factors directly or indirectly affect the quality of
178 management of farm's operators. Bravo-Ureta and Pinheiro [19] indicate that it is not possible to
179 come up with complete list of all the factors affecting the farm specific efficiency but only the
180 most important socio-economic and demographic variables that are expected to affect the farm
181 specific efficiency are considered.

182 Socio-economic and farm specific variables included in this study were: years of schooling of the
183 household head, age of farm's operator, contact with extension agents, farm to market distance,
184 access to credit and tenancy status of the farm's operator.

In order to examine the impact of relevant socio-economic and farm specific variables on inefficiency estimates Tobit regression model [20] of the following form was estimated:

$$E_i = E_i^* = \beta_0 + \beta_1 Z_{1i} + \beta_2 Z_{2i} + \beta_3 Z_{3i} + \beta_4 Z_{4i} + \beta_5 Z_{5i} + \beta_6 Z_{6i} + \beta_7 Z_{7i} + \beta_8 Z_{8i} + \beta_9 Z_{9i} + \mu_i$$

$$E_i = 0 \quad \text{If } E_i^* \leq 0$$

Where;

i refers to the i^{th} farm in the sample.

E_i is an inefficiency measure representing technical, allocative and economic inefficiency of the i^{th} farm.

E_i^* is the latent variable.

Z_{1i} represents the farm size of the i^{th} farmer in acres.

Z_{2i} represents the education of the i^{th} farm's operator in years.

Z_{3i} represents the experience of the i^{th} farmer in years.

Z_{4i} represents the extension visits by extension workers at the i^{th} farm from main market in kilometers.

Z_{5i} is a dummy variable having value equal to one if farmer has access to credit otherwise zero.

Z_{6i} is the house hold size of the i^{th} farms

Z_{7i} is the distance from the main road of the i^{th} farms

Z_{8i} is a dummy variable having value equal to one if renter operator otherwise zero.

Z_{9i} is a dummy variable having value equal to one if owner cum renter otherwise zero.

Z_{10i} is a dummy variable having value equal to one if middle reach otherwise zero.

Z_{11i} is a dummy variable having value equal to one if tail reach otherwise zero.

$\beta^{\text{'s}}$ are unknown parameters to be estimated.

μ_i is the error term.

3. Result and Discussion

3.1 Descriptive Analysis

The results of the findings revealed that small farmers used 51.44 kg seed per acre, while medium farmers used 51.21 kg and large farmers used 52.22 kg seed per acre. The average tractor hours used were 2.67, 2.66 and 2.60 for small, medium and large farmers. The average

total NPK use per acre by small, medium and large farmers were found to be 89.92, 91.47 and 94.99 kg, respectively. The average labors per acre by small, medium and large farmers were found to be 16.39, 18.28 and 19.45 days. Average irrigation hours applied per acre by small farmers are found to be 19.55, while for medium and large wheat farmers' average irrigation hours applied are found to be 17.98 and 17.44, respectively.

Seed cost per acre was higher for small farmers which were Rs. 2,626 while for medium and large farmers costs per acre were Rs. 2481 and Rs. 2622, respectively. The average ploughing cost (tractor cost) were found to be 1826, 1917 and 1804 rupees per acre for small, medium and large farmers. The average total fertilizer cost for small, medium and large farmers were found to be Rs. 4376, Rs. 4598 and Rs. 4778y. The average labor cost for small, medium and large farmers were found to be Rs. 2463, Rs. 2688 and Rs. 2877, respectively. Average irrigation cost per acre for small farmers was found to be Rs. 2309 while for medium and large farmers average irrigation cost are found to be Rs. 2640 and Rs. 2356.

3.2 Econometric Analysis

This section presents the discussion on results obtained through DEA and Tobit regression models. The section is divided into three sections. First section exhibits the efficiency estimates of the sample farms. The second section elaborates the relationship between efficiency estimates and farm size. Last section describes the sources of inefficiencies.

3.2.1 Efficiency Estimates

Results of the findings showed that the mean technical efficiency of sample farms was 0.85, with a low of 0.38 and a high of 1.0. These results indicate that if sample farms worked at full efficiency level they could reduce, on an average, their input use by 16 percent and still produce the same level of output. The mean allocative efficiency of the sample farms was 0.81, with a minimum of 0.05 and a maximum of 1.0. The combined effect of technical and allocative efficiency showed that the mean economic efficiency of the sample farms was 0.68 ranging from 0.052 to 1.0. Results of the study indicated that the existence of substantial allocative and economic inefficiency in the sample farms for wheat in the study area. Findings of the study also showed that if sample farms operated at full efficiency level they could reduce their cost of production by 32 percent without reducing the level of output and with the use of existing technology.

The technical efficiency of majority of the ample farms lies between 0.71 and 0.80 and between 0.91 and 1.0. Out of 120 sample farms, 40 percent farms have technical efficiency greater than 0.90, 24 percent farms have technical efficiency between 0.71-0.80, 20 percent farms have technical efficiency between 0.81-0.90, 10 percent farms have technical efficiency between 0.61-0.70 and other 3 percent farms have technical efficiency below 0.60 (See Table 1).

Table 1: Frequency Distribution of Total Technical Allocative and Economic Efficiency of Wheat crop

Frequency Ranges	TE		AE		EE	
	Freq.	%	Freq.	%	Freq.	%
0.01-0.10	0	0	1	0.83	1	0.83
0.11-0.20	0	0	0	0	0	0
0.21-0.30	0	0	1	0.83	3	2.5
0.31-0.40	2	1.67	0	0	2	1.67
0.41-0.50	0	0	2	1.67	8	6.67
0.51-0.60	3	2.5	4	3.33	20	16.67
0.61-0.70	12	10	13	10.83	33	27.5
0.71-0.80	29	24.17	24	20	26	21.67
0.81-0.90	25	20.8	51	42.5	18	15
0.91-1.00	49	40.8	24	20	9	7.5

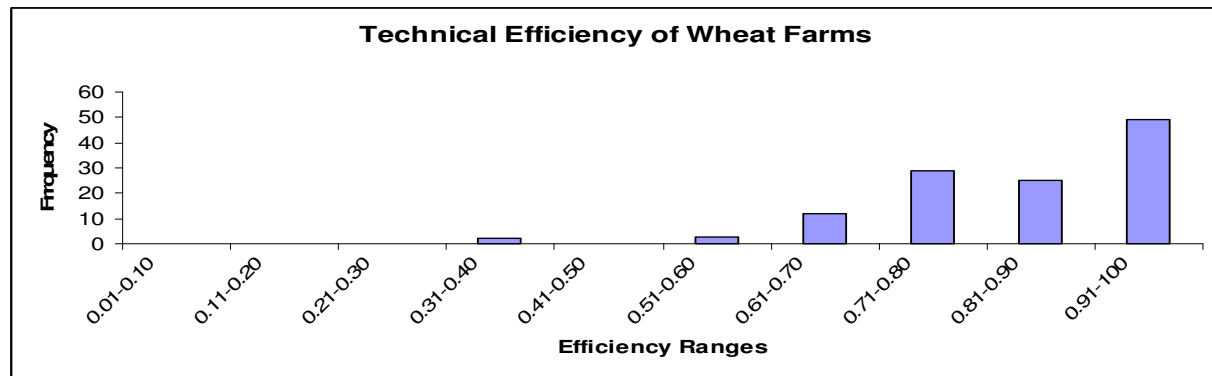


Figure 1: Frequency Distribution of Technical Efficiency of Wheat Farms

The allocative efficiency of majority of the sample farms falls within the range of 0.71 and 1.0. Out of 120 sample farms, only 42.5 percent farms have allocative efficiency between efficiency range 0.80 to 0.91, 20 percent farms have allocative efficiency between 0.71-0.80. Results of the findings revealed that 10.8 percent farms lies in allocative efficiency range 0.61-0.70 and 6.5 percent farms have allocative efficiency below 0.60.

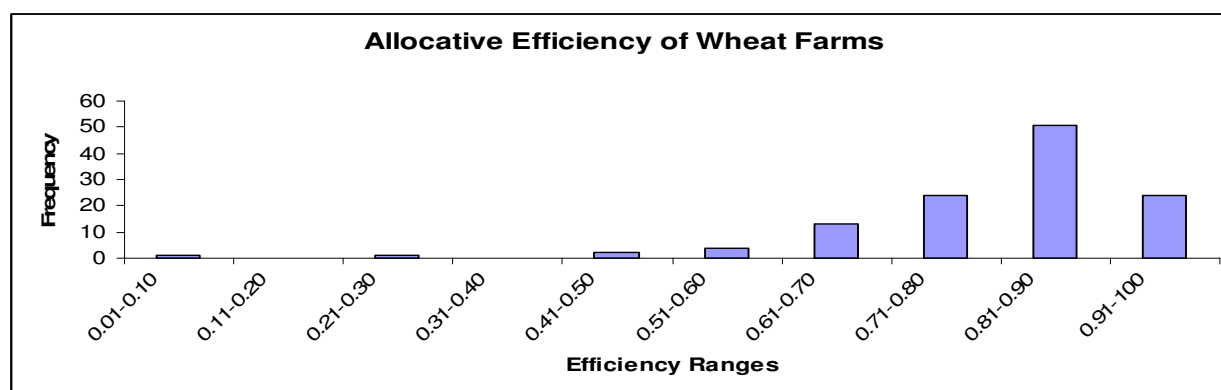


Figure 2: Frequency Distribution of Allocative Efficiency of Wheat Farms

The economic efficiency of majority of the sample farms falls within the range of 0.61-0.70. Out of 120 sample farms, only 7.5 percent farms have economic efficiency greater than 0.90, 27.5 percent farms have economic efficiency between 0.61-0.70, 22 percent farms have economic efficiency between 0.71-0.80, 16 percent farms have economic efficiency between 0.51-0.60. 15 percent farms have economic efficiency between 0.81-0.90 and 11 percent farms have economic efficiency less than 0.50.

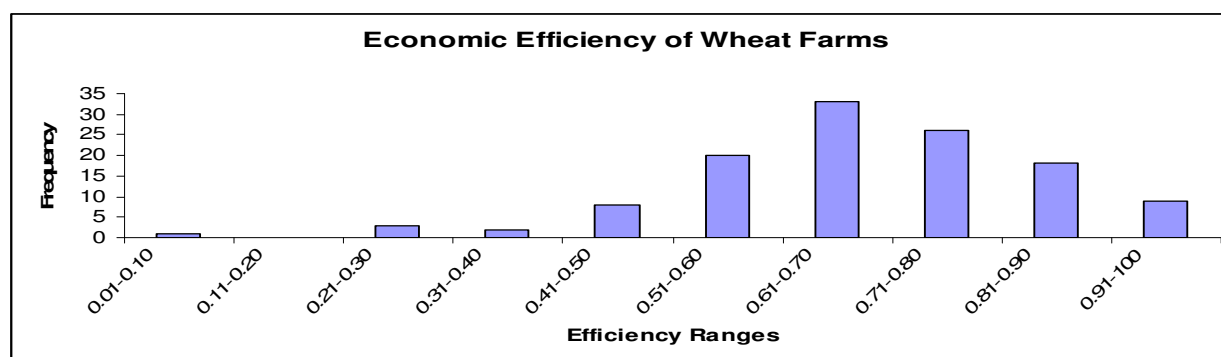


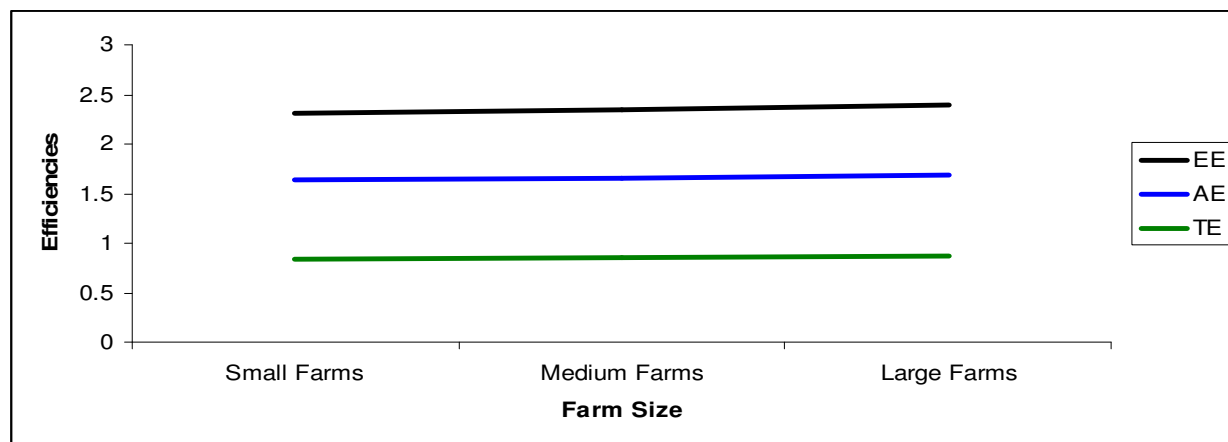
Figure 3: Frequency Distribution of Economic Efficiency of Wheat Farms

3.2 Relationship between Efficiency Estimates and Farm Size

In order to investigate the relationship between total technical, allocative and economic efficiency and farm size total technical, allocative and economic efficiency levels have been estimated according to farm size. Farm size was categorized into three groups on the basis of operational holdings of farmers. Farms with less than 12.5 acres were categorized as small farms, those having 12.5 - 25 acres were termed as medium farms and farms having more than 25 acres were called as large farms.

Large farms are total technically more efficient than medium and small farms (similar to results indicated by [21]). The least total technically efficient farms are small farms as compared to medium and large farms (similar to results indicated by [21]). It is indicated from Table 4 that, on average,

283 small farms are the least scale efficient and large farms are the most allocatively and economically
 284 efficient (Figure 4).



285
 286 Figure 4: Total Technical, Allocative and Economic Efficiency with Respect to Farm Size
 287

288 3.3 Sources of Inefficiencies

289 Socioeconomic and specific farm factors are probable to affect the level of technical, allocative and
 290 economic inefficiency of farmers. The present study makes an effort to examine sources of technical,
 291 allocative and economic inefficiency of wheat farms of district Layyah. In order to find sources of
 292 technical, allocative and economic inefficiency Tobit regression model was used. In Tobit model
 293 technical, allocative and economic inefficiency estimates were separately regressed on socio-
 294 economic and farm specific variables. The coefficients of explanatory variables in Tobit regression
 295 models are of particular interest in terms of understanding the inefficiency differentials among the
 296 farmers and for making policy options.

297 The coefficient of extension visits variable was negative and significant. This implies that the farmers
 298 having more contacts with extension workers were technically less inefficient than their counterparts
 299 who have less/no contacts with extension agents. Results of the study are in accordance with the
 300 findings of Ali [22], Hassan [23] and Yaseen [24]. The observable reason for this relationship may be
 301 that the farmers having more contacts with extension agents may be able to get information about the
 302 state of approved agricultural technology and its uses.

303 The farm to main road distance variable was negatively and significantly associated with the
 304 technical inefficiency of farms. The farm to road distance variable was used as a proxy for
 305 convenience to easy access to transportation. Result of the study suggests that the technical
 306 inefficiency of sample farms would significantly decrease with the development of road and market
 307 infrastructure. According to FAO [25], the utilization of purchased inputs would have been higher in

developing countries if the supply outlets were made available to the farming communities at a walking distance. Ghura and Just [26] argue that only price incentives are not adequate to enhance supplies of agricultural commodities unless these measures are supplemented with continued investment in rural infrastructure (Table 2).

The access to credit dummy variable was introduced to check the impact of availability of credit/loan on technical inefficiency of farmers. The parameter estimate of access to credit dummy variable carries a negative sign. Results of the study imply that farmers having improved access to credit were technically less inefficient than the farmers having poor access to credit. Findings of the study are consistent with the findings of Bravo-Uretta and Evenson [27], Ali and Flinn [28], Hassan [23], Bozogolo and Ceyahan [29] and Idiong [30]. The obvious reason for this relationship may be that credit availability improves the liquidity and facilitates the purchase of inputs like fertilizers, pesticides and improved seeds etc. during peak seasons. Ali [22] argues that credit availability encourages the farmers to introduce high yielding varieties to improve per acre yield.

The coefficient of renter dummy variable was positive and insignificant which implies that there was no significant difference between the technical inefficiency of renters and owner operators. The coefficient of dummy variable owner cum renter was positive and non-significant which implies that there was no significant difference between the technical inefficiency of owner cum renters and owner operators.

Table 2: Sources of Technical Inefficiency of Wheat Farmers

Variables	Coefficient	Std. Error	Prob.
Constant	0.187	0.072	0.009
Farm Size	-0.001	0.002	0.441
Education	-0.004	0.004	0.364
Experience	-0.003	0.002	0.096
Extension Visits	-0.011	0.007	0.098
Loan (Dummy)	-0.104	0.049	0.032
House Hold Size	0.011	0.007	0.097
Distance From Main Road	-0.003	0.002	0.082
Renter	0.028	0.119	0.815
Owner cum Renter	-0.009	0.096	0.923
Middle	0.023	0.037	0.541
Tail	0.110	0.044	0.013

The farm size variable had negative and significant impact on the allocatively inefficiency. This result implies that farmers having large farm size would be less allocatively inefficient. The coefficient of access to credit dummy variable had a positive and significant impact on allocative

inefficiency. The result of the study implies that the farmers having better access to credit were allocatively more inefficient than the farmers having less access to credit. The possible reason for this relationship may be that farmer may not use credit for the agricultural purposes.

The coefficients of renter dummy and owner cum renter dummy variables were negative and insignificant which implies that there was no significant difference between the allocative inefficiency of renters; owner cum renters and owner operators in the study area. The coefficient of dummy for middle and tail farmer was positive and insignificant which implies that there was no impact of location of area on inefficiency of wheat farmers.

Table 3: Sources of Allocative Inefficiency of Wheat Farmers

Variables	Coefficient	Std. Error	Prob.
Constant	0.290	0.057	0.000
Farm Size	-0.003	0.001	0.052
Education	0.001	0.003	0.832
Experience	0.002	0.001	0.122
Extension Visits	-0.002	0.005	0.749
Loan (Dummy)	0.064	0.038	0.093
House Hold Size	-0.010	0.005	0.066
Distance From Main Road	-0.003	0.002	0.042
Renter	0.030	0.099	0.761
Owner cum Renter	-0.104	0.077	0.175
Middle	0.018	0.030	0.553
Tail	-0.036	0.036	0.313

The coefficient of the farm size was negative and significantly affecting the economic inefficiency of wheat farmers. As farm size increases, economic inefficiency will decrease. The coefficient of distance from main road was negative and significant which implies that as the distance of farm from main road increases the economic inefficiency will decrease. The coefficient for education and experience were negative but insignificant which implies that education and experience had no impact on economic inefficiency of wheat sampled farms. The dummy for credit access and owner cum renter was negative and non-significant which shows that there was no difference in economic inefficiency due to credit access or ownership. House hold size coefficient was also negative implies that there was no impact of house hold size on the economic inefficiency of wheat farmers (Table 4).

Table 4: Sources of Economic Inefficiency of Wheat Farmers

Variables	Coefficient	Std. Error	Prob.
Constant	0.431	0.068	0.000
Farm Size	-0.003	0.002	0.037

Education	-0.001	0.004	0.779
Experience	0.000	0.002	0.937
Extension Visits	-0.008	0.006	0.223
Loan (Dummy)	-0.014	0.045	0.763
House Hold Size	-0.001	0.006	0.917
Distance From Main Road	-0.005	0.002	0.006
Renter	0.042	0.117	0.721
Owner cum Renter	-0.083	0.090	0.354
Middle	0.031	0.035	0.386
Tail	0.040	0.043	0.351

4. Conclusion and Suggestions

The most obvious implication from the findings of the study is that there is a need of sound policies to promote formal education of rural households as a mean of enhancing efficiency over the long period of time. This will enable farmers to make better technical decisions and helps them in allocating the inputs efficiently and effectively. Focus on enhancing farmers' access to information via provision of better extension services. Government should allocate more funds to strengthen the extension department and expanding net of extension services in the remote areas. Farmers having better access to credit are more efficient than those with poor access to credit. It is therefore recommended that farmers should be provided assistance in the form of soft loans to enable them to cope with the increasing cost and efficient use of inputs. Government supported programs which reduce the transaction cost of credit to farmers would have positive impact on farm efficiency. As the farms located closer to the market are technically less inefficient than those located away from the market. So, the development of market and road infrastructure should be focused. Supply outlets should be made closer to the farm gate. Younger farmers are technically less inefficient than the older ones. Policies should be devised to attract and encourage younger people in farming by providing them incentives. This would lead to enhance agricultural productivity and efficiency by the injection of new blood in agriculture. Increasing scale of operation is imperative to improve overall technical efficiency of the farms. So, cooperative and corporate farming appears to be the most feasible options in this regard.

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