Analysis of Technical Efficiency of Wheat Producers in Agricultural Development Projects Zone 1, Jigawa State, Nigeria

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***Abstract*:** *The study examined the analysis of technical efficiency of wheat producers in ADP Zone 1 of Jigawa State, Nigeria. Primary data were collected using structured questionnaires from one hundred and twenty-two respondents (122) in the study. Descriptive statistics, Data Envelopment Analysis (DEA) and Tobit regression Analysis were respectively used in determining socio-economic characteristics, technical efficiency and factors affecting the technical efficiency scores of the wheat producers under both the Constant Return to Scale (CRS) and Variable Return to Scale assumptions (VRS). The result revealed that, the mean age of the respondents was 40 years, 110 (91%) were male, 102 (83%) married and 113(92%) attended formal education. The findings also indicated that, the mean technical efficiency scores of the respondents were found to be 45% and 95% under VRS and CRS assumptions respectively. About 84(60%) of the respondents had TE scores more than 0.80 under VRS while only 28(24%) of them had TE scores more than 0.8 under CRS. It was also disclosed that, 28 respondents were fully technically efficient under VRS and only 11 of the respondents were found to be at the frontier under CRS All the six (6) socio-demographic characteristics, namely, gender, household size, marital status, educational level, years of farming experience and, farmers' age were found to be statistically significant towards influencing technical efficiency scores of wheat farmers. The implication of the study is that wheat farmers in ADP Zone 1 of Jigawa State operate below optimal efficiency – especially under constant returns to scale – indicating strong need for improved access to modern inputs, extension services, and technology. Since socio-demographic factors such as education, age, household size, gender, marital status, and farming experience significantly influence efficiency, interventions must be tailored to farmers' characteristics rather than applied uniformly. The high efficiency scores observed under variable returns to scale further suggest that farmers are efficient only at their current production scale, highlighting the importance of policies that support appropriate scaling, credit access, and mechanization. Overall, strengthening farmer training, resource management, and targeted support programs is essential for boosting technical efficiency and wheat productivity in the study area.*

Keywords: Technical Efficiency, Wheat Producers. Agricultural Development Project, Jigawa. JEL Code: C61, Q12, Q18.

Introduction

Wheat (*Triticum*) is a significant cereal in human endeavors, after corn and rice; wheat is among the most consumed grain in Nigeria. According to the latest NBS report on wheat production 2021, In Nigeria wheat is most grown in Kano, Jigawa, Kebbi, Bauchi, Kaduna, Gombe, Yobe, Katsina, Plateau, Sokoto, Zamfara, Borno and Adamawa with 11,820ha of cultivated land producing 36,943,800 metric tonnes. Wheat (*Triticum)* is believed to have been most grown in Kano, Jigawa, Bauchi, Borno, Yobe and Zamfara.

Wheat is the most important grain worldwide based on grain acreage and is ranked second when it comes to the total production volume (Shahbandeh, 2021). The global amount of wheat produced came around 772 million metric tons. There was an increase of almost ten million tons when compared to the previous marketing year (Shahbandeh, 2021). Wheat farming has been the most complicated area of Nigerian agriculture for the last decades, due to the high temperatures that is not favorable for the crop, low production and many more (Haruna et al., 2017). The country imports significant amounts of food and the country also does not earn significant foreign exchange from agriculture (Oirere, 2019). Nigeria depends on the imported wheat in order to meet the demands of its large growing. However, since the oil shock of last quarter of 2014 up to 2016, wheat farming is attracting policy makers who see Nigeria's capacity in wheat production to be self-sufficient (KMPG, 2016).

The widely available variety in Nigeria is called hard wheat (Triticum drum), unlike the winter wheat, it is a bred for the tropical climate. It can be grown in most of the northern states due to heat tolerance ability, but the yield is very poor with about 1MT/ha (Knoema, 2019a; USDA 2020). Despite efforts made by the International Maize and Wheat Improvement Center and International Centre for Agricultural Research in the Dry Areas in collaboration with Lake Chad Research Institute that came up with the two high yielding varieties: Norman Borlaug and Reyna -28 which have potential yields of 5 to 6 metric tons per hectare (KMPG, 2016; Richard, 2019).

Despite Nigeria's strategic location and favorable climate for wheat production, the country still relies heavily on imports to meet domestic demand. Jigawa State, which is one of the major wheat producing states, faces significant challenges in optimizing wheat production. The technical efficiency of wheat producers in Jigawa State is seriously compromised due to various factors including sub-optimal yields, inefficient resources use, lack of technology adoption, climate change, inadequate extension services, poor market access which result into reduced productivity and decreased competitiveness in the global market. In proposing to fill the aforementioned research gap, the following research objectives have been developed:

Objectives of the study

The broad objective of the study is to analyze the technical efficiency of wheat producers in ADP ZONE (BIRNIN KUDU), Jigawa State. The objectives are:

i. To describe the socio-economic characteristics of wheat producers in the study area.
ii. To empirically examine technical efficiency using DEA with Constant Return to Scale (CRS) assumption.
iii. To compute the technical efficiency using DEA with Variable Return to Scale (VRS) assumptions.
iv. To identify determinants of technical efficiency under both the two assumptions CRS and VRS.
v. To identify the constraints associated with wheat production in the study area.

Literature Review

A review of literature aims to serve as foundation of knowledge and provide researchers with understanding of the scope, conceptual and methodological issues relevant to their field of study. Boote and Beile (2005) opined that detailed and refined review of literature forms the basis and inspiration for a meaningful and useful research, the purpose of which is to illustrate how the subject has been studied previously and what were the gaps.

Empirical Studies.

Technical efficiency is one of the most important factors of productivity growth, especially in the management of agricultural production in developing countries. The efficient use of inputs in the production of agricultural products can improve the quality and quantity of these products and, on the other hand, have a great impact on increasing the income of agricultural units, which will enhance the living standard of farmers and the development of rural communities. The existing farming systems, especially in developing countries, are faced with a lack of sufficient resources and opportunities for the development and adoption of modern technologies. Moreover, the unbalanced use of resources in increasing the production of agricultural products has more limited the available resources in the agricultural sector than in the past and has faced the farming system with various problems in the process of growth and development. Therefore, paying attention to the issue of technical efficiency in the agricultural economy of developing countries, including Iran, is of particular importance (Gittinger & Price, 1997).

Farm efficiency measurement is one of the important tools used by both researchers and policy makers in agriculture for evaluating farmers' performance. Farm production efficiency helps to identify source of inefficiency (Shehu, 2013). And efficiency is also an index to guide adjustment of resources and indicating problem areas that need further research (Olayide and Heady, 1982). A production function describes the feasible technical relationship between input and output variables. It shows the process of conversion of input to output and maximum amount of a particular product that can be produced from available alternative combinations of the inputs needed. Researchers such as Etim *et al.*, (2013), Simonyan and Obiakor (2012), Orewa and Izekor (2012), Oluwatusin (2011), Oviasogie (2011) , Shehu *et al.,* (2010), Rahman and Umar (2009), Ojo *et al.,* (2009), Ekunnwe *et al*., (2008), Ojo (2007), Abay, Miran and Gunden (2004) Nmadu and Simpa (2014) has variously studied TE of agricultural production and stressed its importance in increasing production. TE is a success indicator and shows the relative performance of the processes used in the transformation of inputs into outputs (Shehu, 2013 and Awoyinka, 2009). The level to which technical and allocative efficiency are achieved is referred to as production efficiency (Awoyinka, 2009). Farm efficiency measurement can be approached from three ways and these are cost frontier method, profit frontier and production function (the approach of this study using stochastic frontier function).

A deterministic stochastic frontier function introduced to solve the problem of inadequacies of production function in measuring TE (Meeusen *et al. (*1977) and Ali and Flinn, (1989). Deterministic production function explains that all deviations from frontier are attributed to inefficiency whereas in stochastic production function, it is possible to discriminate between random errors and farm specific factors and it differs in efficiency.

A deterministic approach did not put into account that farms' performance can be affected by factors such as bad weather, poor performance of machinery or breakdown of input supply which are all beyond the farmer's control (Forsund *et al.,* 1980). Inefficiency (deviations from the efficiency frontier) could therefore, occur from two sources namely; inefficiency in input-use (which is farm specific) or random variations in the frontier across different farms. Efficiency estimation in deterministic model is affected by statistical noise and this lead to use of stochastic frontier production function which takes care of the sources of inefficiency in production (Etim *et al.*, 2013). The efficiency parameters are included in the stochastic frontier so that their effects on the technical efficiency of producers could be measured. When SFPF is used, any variation in output is both due to technical efficiency effects (which could be controlled with efficient management of both human and material resources) and random error which do not come under the control of efficient management. Maximum likelihood Estimation (MLE) is an improvement on stochastic frontier. This improvement of stochastic frontier model enables one to measure firm level efficiency using MLE procedures; an econometric technique. However, stochastic approach allows for statistical noise Oluwatusin (2011) and Ojo *et al.,* (2009). The inefficient farm could be made efficient by increasing its output with the same input level or using fewer inputs to produce the same level of output (Shehu, 2013). The closer a farm gets to the frontier the more technically efficient it becomes (Ogunyinka and Ajibefun 2003).

Many researchers have in recent times used Stochastic Frontier Production Function (SFPF) for analysis of agricultural data as a result of its ability to closely marry economic concepts with modeling realities (Dawang et al., 2011). This is due to the inherent variability of agricultural production because of interplay of weather, soil, pests, diseases and environmental constraints and farms are mostly owned by families who do not keep correct and required records and accounts of farm activities, hence available data on production are subject to measurement errors (Ojo, 2007). Simpa (2014) and Nmadu and Simpa (2014) worked on TE of yam farmers in Kogi State, Nigeria and found that age, educational level, household size and farming experience decrease technical inefficiency. Orewa and Izekor (2012) and Etim *et al*, (2013) worked on efficiency of yam production in Nigeria and found that the mean technical efficiency was about 70%. Similar works were carried out by Oluwatusin (2011), Shehu *et al.* (2010), Rahman and Umar (2009) and Ojo *et al* (2009) in Nigeria. All these studies concluded that there is more room for Nigerian farmers to increase food production by adjusting policy variables that were either found to increase output and reduce inefficiency. The above studies have also that shown MLE of stochastic frontier production function model is a strong analytical tool for measurement of technical efficiency in agricultural production, because it allows joint estimation of CobbDouglas function and efficiency model.

Research Methodology

Study Area

Agricultural Development programme (ADP) zone 1 is one of four (4) ADP zones in Jigawa state, with its headquarter in Birnin-Kudu LGA. The zone Consists of seven local government areas which are Miga, Jahun , Kiyawa, Dutse, Buji Birnin kudu, and Gwaram LGA in Jigawa state. There is also a Research Institute for Date Palm (Sub-Station) in the zone. It is situated in the north part of the state between latitude 11.00^{O}N to 13.00^{O}N and 08.00^{O}E to 10.15^{O}E. It has a total land area of approximately 7,382km^2 and a total population of 1.4 million. It shares border with Kaugama, Ringim and Hadejia LGAs to the North, Kano state to the West and Bauchi state to the South. The mean annual temperature and rainfall were 31.23^{o}C and 42.97mm(1.69inc.) respectively. The zone is predominantly an agrarian zone with the vast majority involved in Agriculture. The major crops grown include millet, maize, rice, sorghum, cowpea, soybeans and groundnut while the livestock kept includes cattle, goat, sheep and camel, poultry etc. The ethnic languages are predominantly Hausa and Fulani languages.

Sample size and Procedure and sample size

We were unable to obtain the actual registered number of wheat producers from Jigawa Agricultural Development Project (JADA) coupled with not knowing the total population of wheat farmers in Jigawa state, we decided to determine the sample size using **Cochran's formula** for an unknown population (Cochran, 1977):

$$n = \frac{z^2 .\ p\ .\ (1-p)}{e^2}$$

where:
n = required sample size,
Z = Z-score corresponding to the desired confidence level (1.96 for 95% confidence),
P = estimated proportion of the population engaged in wheat farming (assumed to be 11 %, or 0.11, to maximize sample size),
e= margin of error (set at 5%).
Substituting these values:
$n = \frac{1.96^2 .\ 0.11\ .\ (1-0.11)}{0.05^2}$ = 150.43 ≈ **150**

Thus, a sample size of **150 wheat farmers** was chosen to provide statistical reliability and confidence in the findings, allowing for generalizability of results across the study area.
Two state sampling procedures was adopted. The first stage was the selection of two Local government areas namely Jahun and Miga LGAs. The two LGAs were purposively selected on the basis of intensity or availability of wheat producers in the study area. The second stage involved simple random sampling of one hundred and fifty respondents for the study (150). However, only 122 of the questionnaires were found to contain complete information and thus used for the study.

Method of Data Collection
Primary data were used for this study. The data was obtained with the aid of questionnaire and simple interview; the questionnaires were administered to the farmers by the researcher.

Analytical Techniques
Descriptive statistics: This includes; Frequencies, percentages, measures of central tendencies and measures of dispersion. Inferential statistic includes Data envelopment analysis (DEA) and Tobit regression for technical efficiency scores and determinants of technical efficiencies scores respectively.

Estimation of technical efficiency with CRS assumption
Amor and Muller (2010) defined technical efficiency in production as the ability of firms to produce maximum output given a set of inputs and technology while technical inefficiency relates to the failure to attain highest possible level of output given input and technology. Technical efficiency range between 0 and 1, a TE = 1 implies technically efficient production (on the frontier) while TE < 1 implies varying degrees of technical inefficiency (Vu, 2010).

$TE_j = {}_{\theta_j^{CRS},\ x}^{Min} \theta_j^{CRS}$

$\theta_j^{CRS} X_i > X\lambda$

$\lambda \geq 0$

Where: X = Input vector, Y = Output vector, θ_j^{CRS} = Technical efficiency of farm j under CRS.

3.6 Estimation of technical efficiency with VRS assumption
However, Vu (2010) stated efficiency can also be computed under VRS by adding another convexity constraint ($\sum_{j=i}^{n} \lambda_j$ =1) to the first TE equation.

$TE_j = \theta_j^{VRS} = {}_{\theta_j^{CRS},\ x}^{Min} \theta_j^{CRS} + \sum_{j=i}^{n} \lambda_j$=1

Where: $\sum_{j=i}^{n} \lambda_j$ =1, θ_j^{VRS}= Technical Efficiency under Variable returns to scale and other variables as defined earlier.

Determinants of technical efficiency (TOBIT Regression)

In this study, the farmers/farm specific characteristics will be regressed against the scores of technical efficiency to determine factors influencing the technical efficiency. The equation determining factors influencing the technical efficiency is presented below:

$$TE_{Scores} = \Psi_0 + \Psi_1 Z_1 + \Psi_2 Z_2 + \Psi_3 Z_3 + \Psi_4 Z_4 + \Psi_5 Z_5 + \Psi_6 Z_6 + \Psi_7 Z_7 + \varepsilon_i$$

Where $Z_1, \ldots\ldots, Z_6$ represents age of farmer, gender, marital status, level of education, years of experience, farmers' association and access to credit respectively.

Definition of input and output variables

In this study, estimation of efficiency was based on 5 inputs and 1 output. The input and output variables are as follows:

X_1 = Land (Hectares)
X_2 = Fertilizer (Kilogram)
X_3 = Seedlings (Kilogram)
X_4 = Labor (Man-hours/day)
X_5 = other costs (Naira)
Y_1= Wheat yield (Kilogram/year)

Results and Discussion

Table 1 shows the socio-economic variables of wheat farmers in the study area. The age of the farmers ranged from 21 - 72 years with a mean of 40.47. Majority of the wheat farmers were within the age 40 years; this indicates that the wheat farmers were at their active age. The table shows there was gender in-equality among the farmers in the study area, with male scoring 91.8% and female 8.2% respectively. 83.6% of the farmers were married, 13.1% were single, 0.8 and 2.5% were widowed and divorced respectively. Majority of the farmers were educated with 26.2%, 14.8%, 13.9%, 13.1%, and 11.5% having secondary, post-secondary, Bachelor's degree, diploma & primary school and pre-school education respectively. Only 7.4% had no education. This means that the farmers had minimum level of education that could enable them to adopt modern agricultural technology and participate in wheat transformation agenda. Majority of the farmers are having less than ten years of wheat farming experience at 67.2% respectively. The many years of farming experience shows that the farmers are relatively experienced and there is some level of specialization and this would help in cost minimization and achieving greater efficiency. Farmers' group could be formal or informal and almost every farmer belongs to one group or another. The respondent's main occupation was farming which shows the percentage of 68.0% having a highest percent of the farmers. With regards household size, 32.0% had 6-10 persons per household. The average household size was 2.55 persons per household. This shows that majority of the farmers had relatively low household size which might be good economically in terms of the households' activities as there would be less pressure on farmers' output and invariably income.

Table 1: Socio-economic characteristics distribution.

Variables	Frequency	Percentage (%)
Age of farmers	21-40	55.73
	41-60	38.52
	61-Above	5.73
Total	**122**	**100**
Mean	**40**	
Gender		
Male	112	91.80
Female	10	8.19
Total	**122**	**100**
Marital status		
Married	102	83.6
Single	16	13.1
Widowed	1	0.8
Divorced	3	2.5
Total	**122**	**100**
Mean	**1.22**	
House hold size		
1-5	24	19.7
6-10	39	32.0
11-15	28	23.0
15-above	31	25.4
Total	**122**	**100**
Mean	**2.55**	
Educational level		
No-education	9	7.4
Primary school	30	24.6
Secondary school	32	26.2
Post-secondary school	18	14.8
Diploma	16	13.1
Bachelor's degree	17	13.9
Total	**122**	**100**
Mean	**3.49**	
Wheat farming experience		
< 10	82	67.2
10-30	37	30.3
31-above	3	2.4
Total	**122**	**100**
Mean	**1.43**	

Source: Field Survey (2022)

Frequency and percentages of Technical Efficiency Scores under Constant Return to Scale (CRS)

The table below presents the results of the range, frequency and percentages of number of wheat farmers using DEA under constant returns to scale (CRS) assumptions. The mean technical efficiency of the respondents under CRS was 0.45. The values of the mean TE of the smallholders are indicating that 65%, are accounted for inefficiency.

Table 2: Technical Efficiency Scores under Constant Return to Scale assumptions (CRS)

Range	Frequency	Percentage (%)
<-20	16	13.2
0.21-0.30	03	2.46
0.31-0.40	10	8.20
0.41-0.50	20	16.4
0.51-0.60	10	8.20
0.61-0.70	08	6.56
0.71-0.80	10	8.20
0.81-0.90	18	14.75
0.91-0.99	16	13.20
1	11	9.02
Total	**122**	**100**

Source: Field Survey (2022)

Frequency and percentages of Technical Efficiency Scores under Variable Return to Scale (VRS)

The table below present the frequencies and percentages corresponding to the range of efficiency scores for the wheat crops using data envelopment analysis under variable returns to scale (VRS) assumptions. As previously discussed, the sample size was 122. The mean technical efficiencies were computed and found to be 0.95. This means that only 0.05 or 5% are accounted for inefficiency under variable returns to scale assumptions. The table also disclosed that almost 112 farms corresponding to more than 90% of them were found to be having high efficiency scores ranging between 0.8-1.0(i.e 80-100%) efficiency. Also about 28 (22.95%) farms of the respondents were fully technically efficient (at the frontier).

Overall, the results show that wheat farmers perform strongly under VRS conditions, implying that they are efficient at their current production scale and that inefficiency arises largely from scale-related constraints rather than poor management or input misuse.

Table 3: Technical Efficiency Scores under Variable return to scale assumptions (VRS)

Range	Frequency	Percentage (%)
<-20	0	0.00
0.21-0.30	0	0.00
0.31-0.40	0	0.00
0.41-0.50	0	0.00
0.51-0.60	0	0.00
0.61-0.70	0	0.00
0.71-0.80	10	8.20
0.81-0.90	48	39.34
0.91-0.99	36	29.50
1	28	22.95
Total	**122**	**100**

Source: Field Survey (2022)

Determinants of Technical Efficiency of the respondents under CRS assumptions

Table below presents all the coefficients of the 6 socio-demographic factors influencing the technical efficiency scores of wheat farmers under the assumption of constant return to scale

(CRS). All the six (6) factors were found to be highly statistically significant towards influencing technical efficiency scores of the wheat farmers in the study area. Gender, household size, marital status and educational level were found to be more critical in influencing technical efficiency of the respondents. More specifically, the results indicate that all six socio-demographic characteristics examined had a significant influence on the technical efficiency of wheat farmers under the Constant Returns to Scale (CRS) assumption. Among these, gender, household size, marital status, and educational level emerged as the most influential determinants. The significance of **gender** suggests that the role and responsibilities traditionally associated with men and women can affect access to productive resources, decision-making power, and labor allocation, all of which are essential for efficient wheat production. **Household size** plays a crucial role by determining the amount of family labor available for farm activities; larger households may provide more labor support, while smaller ones may face labor shortages, thereby affecting efficiency. **Marital status** is another important determinant, possibly because married farmers tend to have more stable households, better labor support, and stronger social networks, which contribute to improved production decisions and resource management. Furthermore, **educational level** strongly influences farmers' ability to adopt modern technologies, understand extension advice, and apply improved farming practices, all of which enhance technical efficiency.

Although other factors such as **age** and **years of farming experience** were also significant, their effects were comparatively less pronounced. Older farmers may benefit from accumulated experience, while younger farmers may be more open to innovation, creating different pathways through which age influences efficiency. Similarly, farming experience equips farmers with practical knowledge about managing risks, optimizing inputs, and handling production challenges, which contributes to better efficiency outcomes. Overall, the combined influence of these socio-demographic variables demonstrates that technical efficiency in wheat production is not solely a function of inputs, but also shaped by farmers' personal and household characteristics, which affect their capacity to utilize resources effectively.

Table 4.1: Determinants of the Inefficiency under CRS assumptions.

Variables (CRS)	T-value	P-values
Sex(Gender)	5.42	0.000***
Marital status	2.92	0.000***
Household size	3.69	0.000***
Educational level	4.30	0.000***
Years of farming experience	4.63	0.001***
Farmer's age	2.98	0.000***
Constant	3.86	0.003***

Source: Field Survey (2022)

Note:
1% level of significance = ***
5% level of significance = **
10% level of significance = *

Determinants of Technical Efficiency of the respondents under VRS assumptions

The estimates of Tobit regression for the wheat farmers in the study area, under the assumptions of VRS, are presented in table below as shown. The technical efficiency scores were regressed against the determinants using methods of Tobit regression analysis. The results of the estimates revealed that all the 6 of determining factors were statistically significant.

Table 4.2: Determinants of the Inefficiency under VRS assumptions.

Variables (VRS)	T-value	P-values
Sex(Gender)	3.39	0.00***
Marital status	4.32	0.00***
Household size	2.99	0.00***
Educational level	2.40	0.004***
Years of experience	4.63	0.00***
Farmer's age	3.28	0.002***
Constant	4.02	0.000***

Source: Field Survey (2022)

Note:
1% level of significance = ***
5% level of significance = **
10% level of significance = *

Constraints associated with wheat production

More than 70% of the farmers responded to capital or financial constraint whereas almost 60% of the respondents forwarded labour as their major problem. Sixty (60%) highlighted transportation problem and 68% of the farmers indicated seed quality as the main constraint to their productivity. While 72.1% and 82.0% of the farmers lamented problems of disease and insect infestation respectively.

Table 5: Constraints associated with wheat production

Variables (constraints)	Frequency	Percentage (%)
Capital	86	70.5
Labor	62	50.8
Transportation	74	60
Seed quality	68	55.7
Diseases	88	72.1
Insects	100	82.0

Source: Field Survey (2022)

Conclusion

The study examined the technical efficiency of wheat producers across selected Local Government Areas in ADP Zone 1 of Jigawa State. It assessed the level of efficiency and the key factors influencing performance among the farmers. All the socio-demographic variables considered were found to significantly influence technical efficiency in the study area, with gender, household size, marital status, and educational level emerging as the most critical determinants. The results further showed that most respondents operated at a high level of technical efficiency, with a considerable proportion achieving full efficiency under the Variable Returns to Scale (VRS) assumption. In contrast, the Constant Returns to Scale (CRS) model indicated a much lower overall efficiency level, suggesting the presence of resource or scale constraints. This implies that the farmers performed better under VRS conditions than under CRS, highlighting the importance of flexible production conditions for improving efficiency.

Based on the findings the following recommendations were provided

(1) Government should provide farm inputs such as agrochemicals (herbicide, insecticide or pesticide), fertilizer, irrigation machine, sprayer and improved seed varieties for farmers to improve their productivity.
(2) Female gender should be encouraged to engage into wheat farming in order to enhances eradicate poverty and gender bias in the community.
(3) Government should employ more Agricultural extension workers in order to bring knowledge to the farmers on new innovation and ideas in Agricultural sector.
(4) Farmers should be given more awareness on the benefit and impact of Agricultural co-operatives or groups to their production.

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