

THE IMPACT OF MARKET ACCESS ON INPUT USE AND AGRICULTURAL PRODUCTIVITY AMONG CEREAL CROP FARMERS IN NIGER STATE, NIGERIA

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ABSTRACT

The study examined the effect of market access on input used and agricultural productivity among cereal crop farmers in Niger State, Nigeria. Data used for this study were collected from primary sources using multi-stage sampling technique with structured questionnaire administered to 250 randomly selected cereal crop farmers in Niger State. Descriptive statistics, total factor productivity (TFP) and three stages least square (3SLS) regression were used to analyse the data collected. The results revealed that cereal crop farmer's productivity increased with easy market access to inputs across farm size groups in the study area. The study further revealed market access had positive and significant effect on fertilizer; agrochemical and high yielding seed used at 5% and 1% probability levels respectively. The study revealed that decrease in time to market led to 2% increase in cereal crop farmers' productivity in the study area. The productivity (Model I) had chi square value of 25.01, which is statistically significant at 1% probability level. The fertilizer used (Model II), agrochemical used (Model III) and high yielding seed (Model IV) had chi-square values of 453.19, 257.26 and 8.57 respectively and these values were all statistically significant at 1% probability level. This implies that all the explanatory variables included in each of these models jointly explained variations in their dependent variables in the study area. The study also revealed that the major constraints faced by cereal crop farmers were diseases, pests attack, and inadequate credit facilities in the study area. Based on the above findings, the study recommends that government should provide enabling environment to support private sector operatives of the agro-inputs industry, with the view to providing adequate farm input to farmers in the study area.

Keywords: *Market Access, input use, productivity*

INTRODUCTION

Agriculture in Nigeria is dominated by smallholder farmers, who constitute about 80% of the farming population (Oladeebo, 2012). These smallholder farmers practice agriculture at subsistence level due to inadequate market access on input use. The issue of market access on input use has been of great concern to building up farmers' production capabilities, and raising their incomes from agricultural production (Makhura, 2001). Thus, the effect of inadequate market access on inputs use

becomes a major obstacle facing small-scale farmers, and imparting negatively on their incomes, food security, rural employment, and sustainable agricultural growth. According to Langyintuo (2020), numerous factors account for the low productivity of agriculture in Africa, not limited to lack of use of improved agricultural technologies, especially improved seeds, fertilisers and mechanisation services, which in turn is an artefact of the lack of access to agricultural finance. The smallholder farmer still

remains unprofitable, characterized by low uptake of improved farm inputs, with production mainly for own consumption (Poulton *et al*, 2005). The expansion of smallholder farming can lead to a faster rate of poverty alleviation, by raising the incomes of rural cultivators and reducing food expenditure, thus reducing income inequality (Kamara 2004; Barham and Chitemi 2008).

In most years, the yields of cereal crops such as maize, rice, sorghum, millet and wheat have stagnated due to inadequate input use leading to problems of low real income for smallholders and food shortages. Therefore, ensuring market access for inputs use is necessary for productivity enhancement and use of appropriate environment saving technologies.

It is noted that many smallholder farmers cannot afford to buy agricultural inputs (such as seeds, fertilizers and other agrochemicals) because they are too expensive. Many agricultural inputs have been subject to high price increase as a result of sharp practices by middlemen, price control and currency depreciation (Takeshima, 2011). The price structure and yield response are such that the use of certain agro inputs may no longer be justified on crops produced for the domestic market. According to Gordon (2000), the inherent high cost of input delivery to farming areas under the market and infrastructure conditions prevailing at present times is alarming. The low volume of import, less discount, for bulk purchases and higher per unit transport costs, dispersed local markets and contributed to high cost per unit of input.

The International Fertilizer Development Center (IFDC) (2006), reported that lack of fertilizer at appropriate formulation or the

absence of important complementary agro inputs like spray pumps for chemicals, seasonal availability, or inability of market to respond due to the absence of local retailers, coupled with travel distance to inputs sources greatly limit access to agro-inputs and limited productivity. Kelly *et al*, (2003), have established that inadequate access to information undermined farmers' access to agro-input by smallholder farmers. Farmers' market access to agricultural inputs is one of the most crucial factors affecting input use and productivity among small scale farmers.

In most of the government and individuals' efforts in discussing and addressing the problem of low productivity among farmers in Nigeria, emphasis is mostly laid on the utilizations of inputs by farmers with little attention given to whether farmers actually had easy access to these inputs in the market or not. This had actually provided a barrier in recognizing and separately quantifying the direct or indirect effect of market access to basic farm inputs on farmers' productivity which is crucial for policy formulation and implementation.

Therefore, the focus of this research was to examine farm input use and productivity of small-scale cereal crop farmers as a result of market access to farm inputs in Niger State, Nigeria. Hence, the objectives of this study are to estimate the input use and aggregate productivity by farm size and market access among cereal crop farmers, determine the effect of market access on productivity of cereal crop farmers, determine the effect of market access on input use among cereal crop farmers and identify the problems faced by cereal crop farmers in the study area.

METHODOLOGY

The Study Area

The study was conducted in Niger State of Nigeria. Niger State is located between latitudes 8°11' N and 11°20' N and longitude 4°30' E and 7°20' E. It is bordered on the north-east by Kaduna state and on the South-east by the Federal Capital Territory, Abuja. It is also bordered on the North, West, South and Southwest by Zamfara, Kebbi, Kogi and Kwara States respectively. It shares a foreign border with the Republic of Benin in the North West. The state covers an estimated land area of 76,363 square kilometers and a population of 4,082,558 people (Wikipedia, 2010).

The state is agrarian and well suited for production of arable crops such as cassava, cowpea, yam, and maize because of favourable climatic conditions. The annual rainfall is between 1100mm – 1600mm with average monthly temperature ranges from 23 and 37 °C (Wikipedia, 2010). The vegetation consists mainly of short grasses, shrubs and scattered trees.

Sampling Technique and Sample Size

In this study, a multi-stage sampling technique was used in the selection of respondents in order to allow random sampling after the group has been determined. The first stage involved random selection of three Local Government Areas (LGAs) one (1) from each of the three (3) agricultural zones in the State. The second stage involved random selection of villages from each (LGAs) selected. The number of villages selected was proportionate to the total number of villages in each (LGAs). The third stage involved random selection of farmers from the villages selected based on the required sample size. Two hundred and

fifty (250) cereal crop farmers were sampled in total, for the study.

Data Collection

This study used primary data from farming households engaged in the production of cereal crops. The data were collected through the use of structured questionnaire and interview schedule by the researcher. Data were collected with the help of the trained enumerators under the supervision of the researcher. Data collected included socio-economic characteristics such as farmer's age, sex, marital status, household size, and years of experience, farm size and level of education. Data on other variables that influenced agricultural productivity such as fertilizer, improved seed, agrochemicals, market access, credit and labour were also collected.

Data Analysis

The analytical tools used to achieve the objectives of the study included descriptive statistics, total factor productivity index and a three stage least squares regression model.

Total Factor Productivity

The Total Factor Productivity (TFP) index was used to estimate the productivity of cereal crop farmers in the study area. The formula given in equation 1.

$$TFP = VOP/VIE \dots (1)$$

where,

TFP = Total Factor Productivity

VOP = Value of aggregate Output produced in Naira

VIE = Value of Input employed in Naira

A Three Stage Least Squares Regression Model

A three stage least squares regression model was used to estimate the effect of market access on inputs used and

agricultural productivity. The analysis builds on previous findings, namely that the impact of market access on aggregate agricultural productivity is observed at two levels: a direct effect through market-induced allocation of land to high value crops (specialisation), and an indirect effect through the intensification of input use to raise productivity (Kamara, 2004). The model specification draws largely on the relationship between market access, aggregate productivity and input use. The model consists of four basic equations, specified according to the relationships between the respective variables. The equations are as specified in equations 2 to 5.

(i) Effect of market access a total factor productivity

$$TFP = F_1 (FERT, AGCH, HYS, MA, LBR, CRED, FSIZE, EXTN) \dots\dots\dots(2)$$

where,

TFP = Total Factor Productivity (TFP index)

FERT = Fertilizers (Kg)

AGCH = Agrochemical (Naira)

HYS = High yielding seeds (Kg)

MA = Market access (Time taken in minutes)

LBR = Labour input (Man-days)

CRED = Credit in (Naira)

FSIZE = Farm size in (Ha)

EXTN = Extension contacts (Number of extension visits/year)

The proxy for market access is ‘time taken to the market’, which is more appropriate than physical distances, due to differences in wealth and farm resources, and hence, different means of transportation (Kamara, 2004).

(ii) Effect of market access on fertilizer use

The equation for the effect of market access on fertilizer use is specified as follows:

$$FERT = F_2 (HYS, MA, LBR, CRED, FSIZE, EXTN) \dots\dots\dots(3)$$

where,

FERT = Fertilizers Used (Kg/ha)

HYS = High yielding seeds (Kg)

MA = Market access (Time taken in minutes)

LBR = Labour input (Man-days)

CRED = Credit (Naira)

FSIZE = Farm size in (Ha)

EXTN = Extension contacts (Number of extension visits/year)

(iii) Effect of market access on agrochemical use

The equation showing effect of market access on agrochemical use is specified as follows:

$$AGCH = F_3 (HYS, MA, LBR, CRED, FSIZE, EXTN) \dots\dots\dots(4)$$

where,

AGCH = Agrochemical used (Naira)

HYS = High yielding seeds (Kg)

MA = Market access (Time taken in minutes)

LBR = Labour (Man-days)

CRED = Credit (Naira)

FSIZE = Farm size in (Ha)

EXTN = Extension contacts (Number of extension visits/year)

(iv) Effect of market access on high yielding seeds

The area under high yielding seeds is influenced by market access, credit, farm yard manure, labour and extension services. The equation showing effect of market access on high yield seeds used is specified as follows:

$HYS = F_4 (MA, LBR, CRED, FYM, FSIZE, EXTN) \dots\dots\dots (5)$

where;

HYS = High yielding seeds (Kg)

MA = Market access (Time taken in minutes)

LBR = Labour input (Man-days)

CRED = Credits (Naira)

FYM – Farm yard manure (Tons/ha)

FSIZE = Farm size in (Ha)

EXTN = Extension contacts (Number of extension visits/year)

RESULTS AND DISCUSSION

Input Use and Aggregate Productivity by Farm Size and Market Access in the Study Area

The results of input use and aggregate productivity by farm size and market access in the study area are presented in Tables 1 and 2. Farms with less than 2.01 hectares were categorized as small farms, those having 2.01-4.00 hectares were termed as medium farms and farm having more than 4.00 hectares were called as large farms. This classification should not be confused with economic size since all the sample households are smallholder farmers. This classification is only for this study.

As shown in Table 1, the result revealed that market access had positive effect in agro-inputs used by cereal crop farmers in the study area. The difference in the use of agrochemical and manure across market access group was significant at 5% while the difference in the use of fertilizer and improved seed was significant at 1% and

10% respectively, meaning that market access of cereal crop farmers will lead to increased use of input in the study area. This agrees with Umhlaba, (2008), who reported that input as a raw material for production, easy market access to input has potentials for agricultural productivity of farmers in Nigeria. The findings of Kamara, (2004), also reported that easy market access has been found to facilitate access to inputs hence encourages input intensification and agricultural productivity of farmers. Dorward *et al.* (1998) findings stressed that market access to input has significant role in fostering agricultural productivity and alleviating poverty among farmers in Africa.

A similar trend was observed in Table 2, the results revealed that there was a significant difference in the farmers' productivity across farm size groups with variations in market access in the study area. The finding shows that cereal crop farmers' productivity increased with easy market access to variable inputs across farm size in the study area. This implies that easy market access to input has potentials of creating new opportunities in the development of small farm holders in the study area. Apart from small scale farmers, the difference in medium and large farmers' productivity across the market access groups was significant at 5% and 1% respectively. However, farmers with easy access experienced greater productivity than those with difficult market access in the study area.

Table 1: Input use by market access in the study area

Inputs	Easy Access (n =138)		Difficult Access (n = 112)		T value
	Mean	StandardDeviation	Mean	StandardDeviation	
Agrochemical	23.06	12.50	27.35	13.64	2.59**
Fertilizer	355.80	34.87	421.88	39.84	2.72***
Manures	9.23	5.06	10.55	3.43	2.56**
improved seed	7.36	4.02	4.59	2.28	1.79*

*, ** and *** significant at 10%, 5% and 1%

Source: Field Survey, 2017

Table 2: Aggregate productivity by farm size and market access in the study area

Farm Category	Mean values of aggregate productivity				T-value
	Easy Market Access		Difficult Market access		
	Mean	Count	Mean	Count	
Small Scale	14.85(2.47)	18	6.22(3.65)	6	0.78
Medium Scale	9.66(1.29)	95	8.31(3.55)	79	2.24**
Large Scale	9.82(2.17)	29	7.87(1.63)	30	3.14***
All farms	10.35(2.21)	138	8.14(3.20)	112	2.19**

*** Significant at 1%. Values in parentheses are standard deviations

Source: Field Survey, 2017

Effect of Market Access on Productivity and Input Use of Cereal Crop Farmers in the Study Area

The results of three stage least squares regression showing the effect of market access on productivity of cereal crop farmers is presented in Table 3. The results revealed that the market access had positive and significant effect on cereal crop farmer’s productivity in the study area. Also fertilizer, agrochemical and labour had positive and significant coefficients meaning that these inputs had positive influence on the cereal crop farmers’ productivity in the study area. This finding is in line with Bienabe *et al.* (2004), who reported that market access to high production resources, are important factors that influence the farmers’ productivity. This also agrees with the findings of (IFDC) (2006) who reported that increased

used of variable inputs create a conducive atmosphere for agricultural productivity and to enable farmers (especially small holders) produce for markets and lift them out of poverty.

It is worthy of note that the variability of interest in this study, that is, market access (decrease in time taken to market), has a direct effect on the productivity which implies that farmers productivity increased with decrease in time to market (or improved market access). This revealed that when holding other factors constant increased in market access led to 2% increase in cereal crop farmer’s productivity in the study area. This agrees with the finding of Negash (2007), who reported that any improvement in market access will encourage specialization and increase farmers’ productivity. It is also in

line with the finding of Reardon and Timmer (2008), stressing that market access of farmers is a major driving force of agricultural intensification with concomitant development of markets for agricultural inputs. He further reported that improving farmers' access to markets has potentials of improving the household income; increasing agricultural produce and triggering sustainable crop production, thereby reducing their income constraint hence are able to purchase the external inputs that are required to increase agricultural productivity. The various chi

square values across the models revealed that all the variables included in each model significantly explain variations in the use of these inputs.

The results as presented in Table 3 revealed that productivity (Model I had chi-square value of 25.01, which is statistically significant at 1% probability level. This implies that all the variables included in this model jointly explained variation in productivity of the farmers in the study area.

Table 3: Three stage least square (3SLS) regression coefficients and t values

	Productivity (Model I)	Fertilizer used (Model II)	Agrochemical used(Model III)	High yielding seed(Model IV)
Explanatory Variables	Coefficient (T-value)	Coefficient (T-value)	Coefficient (T-value)	Coefficient (T-value)
FERT	0.15 (8.13)***	-	-	-
AGCH	0.41 (2.40)**	-	-	-
HYS	0.12 (0.02)	2.56 (6.17)***	-0.03 (-0.89)	-
MA	0.02 (2.73)***	0.25 (2.05)**	0.0046 (2.30)**	0.01 (2.68)***
LBR	0.07 (7.73)***	-	-	-
CRED	-	-3.60 (-0.82)	0.04 (0.14)	1.08 (2.05)**
FSIZE	-	0.58 (3.06)***	1.22 (9.18)***	1.79 (9.86)***
EXTN	-	-	-0.01 (-0.55)	-0.02 (-0.86)
R ²	0.26	0.18	0.30	0.30
Chi ²	25.01***	453.19***	257.26***	8.57**

*, **, ***=significant at 10%, 5% and 1%.

Figures in parentheses are t-values

Source: Field Survey, 2017

The results in Table 3 further show the effect of market access on input use of cereal crop farmers in the study area. The results revealed that fertilizer used (Model II), agrochemical used (Model III) and high

yielding seed (Model IV) had chi square values of 453.19, 257.26 and 8.57 respectively and these values were all statistically significant at 1% probability level. This implies that all the explanatory

variables included in each of these models jointly explained variations in their dependent variables in the study area.

The results in Table 3 also goes further to reveal that market access had positive and significant effect on fertilizer; agrochemical and high yielding seed used at 5%, 5% and 1% probability levels respectively. This implies that the quantities of fertilizer, agrochemical and high yielding seeds used increased with easy market access (or decrease in time to market). This agrees with the finding of Hau and Von Oppen (2002), who reported that decrease in time taken to market increases intensification of quantity of agro inputs used by the farmers.

Constraints Faced by the Cereal Crop Farmers in the Study Area

Table 4 describes the constraints faced by the cereal crop farmers in the study area. The constraints considered were pest attack, diseases, pilfering (theft), inadequate rainfall and inadequate credit facilities. In ranking order, disease attack ranked 1st which revealed that 100.00% of the respondents were faced by the problem of diseases. This implies that disease is the major constraint faced by the cereal crop farmers and this could lead to low crop productivity in the study area. This agrees with finding of Idem & Showemimo (2004), who reported that disease infestation was a serious constrain affecting cereal crop productivity in Nigeria. The result also indicated that inadequate rainfall ranked 5th which implies that cereal crop production was less affected by rainfall in the study area.

Table 4: Constraints Faced by Cereal Crop Farmers in the Study Area

Variables	*Frequency	Percentage	Cumulative percentage	Rank
Disease	250	100.0	100.0	1 st
Pest attack	249	99.6	99.6	2 nd
Inadequate credit facilities	248	99.2	99.2	3 rd
Pilfering	245	98.0	98.0	4 th
Inadequate rainfall	15	6.0	6.0	5 th

* = Multiple responses

Source: Field Survey, 2017

CONCLUSION AND RECOMMENDATIONS

The study examined the effect of market access on input used and agricultural productivity among cereal crop farmers in Niger State, Nigeria. The results revealed that decrease in time taken to get inputs to market led to 2% increase in cereal crop farmers' productivity in the study area. The

study further revealed market access had positive and significant effect on fertilizer; agrochemical and high yielding seed used at 5% and 1% probability levels respectively. The study also revealed that the major constraints faced by cereal crop farmers were diseases, pests attack, and inadequate credit facilities in the study area.

The study concluded that the quantity of input used by cereal crop farmers increased with improvement in market access to inputs will led to an increase in agricultural productivity.

Based on the above findings, the study recommends that government should make basic farm inputs such as fertilizer, improved seeds and agrochemical should be made available and easily accessible to the farmers through extension services. Also, farmers should form cooperative societies that will help in pooling resources together to procure these basic farm inputs easily and in sufficient quantity.

REFERENCES

- Barham, J., and Chitemi, C. (2008). Collective action initiatives to improve marketing performance lessons for farms groups in Tanzania: *Collective action for property rights (CAPRI)*. Working paper No. 74.
- Bienabe, E., Corone, L. C., Lecoq and Liagre, L. (2004). Linking smallholder farmers to markets: Lessons learnt from literature review and analytical review of selected projects. Breton: *The World Bank*. 15 – 73.
- Dorward, A., Kydd, J. and Poulton, C. (1998). Smallholder cash crop production under market liberation. *A New International Economics perspective*, 1, 240-265. Wallingford UK CAB International.
- Gordon, A. (2000). Improving smallholder access to purchase inputs in Sub-Saharan Africa. *Policy series 7*: 602 – 610.
- Hau, A. M., and Von Oppen, M. (2000). Market access and agricultural productivity in Doi Northern Villages. International symposium on natural resources in Southeast Asia: Challenges for the 21st century, 8-11 January, Chiang Mal. Thailand.
- Idem, N. U. A. and Showemimo, F. S., 2004. *Cereals crops of Nigeria: principles of production and utilization*. Ade Commerical Press, Zaria. Pp. 38-78.
- International Fertilizer Development Corporation (IFDC) (2006). Nigeria company re-open only urea Fertilizer plant in sub-Saharan Africa to meet summit call. Africa green revolution Retrieved on July 15, 2016 from www.ifde.org/New_Design_whats_New/Notore%20Final%206%2013%20.pdf.
- International Fund for Agricultural Development (IFAD) (2010). Rural poverty report on. Retrieved on March 8, 2011 from www.ifad.org/rpr2011/reportle/rpr2011.pdf.
- Kamara, A. B. (2004). The impact of market access on input use and agricultural. Productivity. Evidence from Machakos District, Kenya. *Agrekon*, 43(2): 43 – 52.
- Kelly, V., Adesina, S. A. and Gordon, A. (2003). Expanding access to agricultural inputs in Africa. A review of recent market development experiences, *Food Policy*, 28, 379 – 404.
- Langyintuo A. (2020). Smallholder farmers' access to inputs and finance in Africa. In: Gomez y Paloma S., Riesgo L., Louhichi K. (eds) *The Role of Smallholder Farms in Food and Nutrition Security*. Springer, Cham. https://doi.org/10.1007/978-3-030-42148-9_7
- Makhura, T. M. (2001). Overcoming transaction costs barriers to market participation of smallholder farmers in the Northern Province of South Africa. *Unpublished PhD Thesis*, Pretoria, University of Pretoria. pp 1-6

- Negash, R. (2007). Determinants of adoption of improved haricot bean production package in Alaba special Wareda, Southern Ethiopia. *Unpublished MSc. Thesis*, submitted to Haramaya University, Southern Ethiopia, 137p.
- Oladebo, J. O. (2012). Resource use efficiency of small and large farmer in South Western Nigeria. Implication for food security. *International Journal of Food and Agricultural Research*. 12(1), 227 - 235.
- Poulton, C. S., Dorward, A. and Kydd, J. (2005). The future of small farms, New directions for services. *Institutions and intermediation paper presented at the future of small farm, Workshop, 26-29 June 2005*. Imperial College Wye.UK. pp 379
- Reardon, T. and Timmer, C. P. (2007). Transformation of market for agricultural inputs and output in developed countries since 1950. How has thinking changed? *Handbook of Agricultural Economist*, 3(1), 1 – 20.
- Takeshima, H., Adeoti, A. & Salau, S., 2011. Measuring the effect of transaction costs for investment in irrigation pumps: Application of unobserved stochastic threshold model to the case of Nigeria. *African Journal of Agricultural and Resource Economics* 6(2), 118 – 143.
- Umhlaba, Y. (2018). *A study on agricultural support services offered by the private and public sectors in South Africa*. Belgian Technical cooperation (Mineo): pp. 970 – 978.
- Wikipedia, 2018. Encyclopaedia. retrieved June10, 2019 from <http://en.wikipedia.org/wiki/NigerState>