

Using ODL aided by ICT and internet to increase agricultural productivity in rural Nigeria

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Abstract

ODL materials aided by ICT and internet have a great potential in transforming the backward African agriculture into a commercial level if the ICT and internet facilities can be sustained in rural areas.

A project was implemented in rural Nigeria after a model that makes ICT and internet run sustainably in rural locations.

At a pilot level in Ago-Are village in Oyo State Nigeria, a multi-purpose community information access point was established with basic ICT infrastructure including internet access. The access point provides links to the Community Help Desk and other sources of information on the internet; provides training to farmers; links them directly with inputs and output markets, and provides an array of equipments that farmers lacked on rental basis.

ODL materials to increase productivity, add value and market agricultural products, and for fostering newly developed agricultural enterprises were also produced and used.

Participating farmers increased their holdings, external inputs used, and productivity leading to higher incomes with attendant evidence of graduation into commercial farming. General income made by center in the first year of operation was fifty percent more than required to keep the ICT and internet infrastructures running.

INTRODUCTION

Agriculture is important to Africa and Africans. About 70% of the populace in Africa is involved in agriculture. It is the main stay of the economy of several African countries contributing a high percentage of the GDP. African agriculture is bedeviled by several problems making the continent the most backward in agricultural production. The farmers are largely in the rural areas with small and fragmented plots, having little or no contact with extension services and crucial information needed for production, processing and marketing. They have no knowledge of market prices and little access to input and output markets. Consequently, yields are low, and incomes from agriculture leave little for the farmer to turn over.

Information is widely acknowledged as one of the critical factors of production decisions. Patrick et al. (1993) opined that farmer's demand for information has increased in recent years due to greater market instability, more complex production technologies among others. Lack of timely information can prevent good quality decision and thus lower the efficiency of production decision among farmers. Differences in decisions about what crops to grow can be attributed to differences in resources, levels of knowledge, environment, approaches concerning uncertainty and other factors (Mar Corazon et al 1998). Farmers require information to link various inputs at reasonable prices, and also link output markets (Adekunle et al 2004). A combination of the two may increase farmers income. Arokoyo (2005) noted that "a strong (extension) linkage complimented by flawless information flow enhanced by the effective use of information and communication technologies (ICTs) will significantly boost agricultural production and improve rural livelihoods in developing countries". As true as this is, it has not been proved or tested practically.

About the project and the study

Given the acknowledged role of information in agricultural decision-making, the project titled "Answering Farmers Needs in Nigeria" was implemented at a pilot scale in Ago-Are Nigeria. The project is a private-public collaborative project involving several organizations. Some of the collaborating partners include the Commonwealth of Learning (COL), the International Institute of Tropical Agriculture; (IITA), Ibadan, Total Development International Foundation (TODEV), and Oke-Ogun Community Development Network.

The project provided an access to information through an integrated resource center in which information and communication technologies including the internet provided communication links for farmers. Besides, the center provided some Open and Distance Learning Materials to meet the felt needs of the farmers and also linked them through the internet to other useful websites providing information on agricultural production, processing and marketing. Farmers were also linked to the inputs and output markets. In addition to all these, the center also provided a rental service to make available all implements that most of the farmers cannot afford individually. The resource center was connected to market information services providing market prices for a number of commodities from about a hundred markets across Nigeria and corresponded directly with the "farmers support desk" established at the International Institute of Tropical Agriculture for the provision of real time responses to farmers' requests. In order to empower the farmers, five farmers tagged 'change agents' were identified and trained both on technical agricultural issues as well as computer use and internet browsing. The other farmers were organized into groups of twenty-five for effective training needs identification and delivery. Each of the 'change agents' was assigned to a group of twenty-five farmers. This process resulted in the training of about 125 farmers in the community in the first cycle. Products of a cycle of training became trainers at subsequent cycles.

Financial support for the center came from side activities which included check-offs from extra income made by farmers from new enterprises established for them through the information access point and also through the sales of inputs. Additional money was generated from browsing and through film/ soccer shows to adults and youths in the village. The center was established in the last quarter of 2004 with funding that lasted for six months. Thereafter, the farmers continued to manage the center using internally generated resources. By the time this study was conducted in March 2006, the center had operated independently for one whole year.

This study was conducted to compare key productivity variables for participating farmers at two levels. These are at a point before the commencement of the project and at 18 months after the project had commenced. This was to confirm the actual benefits of the information access point established through the project and the potential of the established institutional supports to sustain the services provided at the center.

Specifically, the objectives of the study are to determine the effects of the project on:

- i. Yield of maize for participating farmers
- ii. Farm income of the respondents
- iii. Level of inputs used
- iv. Farm size of participating farmers

Results obtained from this study will provide insights into derivable benefits of enhanced information flow for agricultural and rural development. It will also serve as lessons for other developing countries as they strive to improve their food and agricultural sector.

Hypothesis

Arising from the objectives of the study, the following hypotheses stated in null form were tested using the data obtained during the course of the study

Ho1: The yield of maize for participating farmers measured before the project and 18 months after are the similar.

Ho2: Farm incomes of participating farmers at the two levels are equal.

Ho3: The levels of inputs used at the two levels are the similar

Ho4: The farm income measured before the project and 18 months after are the same.

METHODOLOGY

The Study Area:

This study was conducted in the project area in ATISBO Local Government Area of Oyo State. Data was collected from 100 randomly selected beneficiaries of the project within Ago-Are community at the beginning of the project translating to the baseline data and at eighteen months after commencement. Ago-Are is a community located about 100km from Ibadan in ATISBO Local Government Area of Oyo State. The community is agrarian in nature with a population of about 12000. The major crops produced in the communities include maize, cassava and yam. In addition, tobacco is also produced as a cash crop.

Impact Measurements:

The impact of ICT on farmers was studied with the use of t-test in order to empirically establish if there is any difference between the performance of farmers before the project commenced and 18 months after. This is justified on the basis that the differences between two means could be established with the use of t-test. Yield of maize which is a common crop for all the farmers was used as a proxy variable for productivity. Income generated from their total agricultural enterprises was used as their income level. The ratio of adopted fertilizer compared with recommended was used as a proxy for adoption of improved practices, while the farm sizes were actually measured.

RESULTS AND DISCUSSIONS

Benefits of ICT and internet connectivity

Benefits of ICT and internet connectivity in the rural setting were captured through the measurement of various parameters. Table 1 contains the means of farm sizes, external inputs used, yield of maize, and incomes reported by participating farmers before and 18 months after project implementation.

Table 1: Means of variables and t test values

Variables	Mean before project implementation	Mean 18 months after project implementation	T value	Pr > t
Yield per unit area	1.05	2.46	13.80	<.0001
Income	436.5	3284.9	15.51	<.0001
Use of external inputs	0.22	0.64	12.27	<.0001
Farm size	2.22	3.76	16.77	<.0001

ICT, crop yield and productivity

For this particular study, yield of maize was considered as a proxy for productivity at the farm level. Farmers in Ago-Are village are familiar with maize and all participating farmers grew maize both as a sole crop and as a component in intercropping systems. Information and Communications technology and the internet significantly ($P < 0.0001$) enabled participating farmers to increase the yield of their maize crop. The average yield of maize per hectare in monoculture among participating farmers was 1.05 tons per ha before the project. When this study was conducted eighteen months after the commencement of the project, the average yield of maize for participating farmers had been significantly increased to 2.46 tons per ha. Increase in yield was largely due to the fact that the farmers were able to get a new variety and reach for information on how to grow the new variety through interactions with scientists made possible by the internet.

ICT and farmers income

Income made by farmers is also recorded in table 1. Increase in yield is desirable for farmers especially when it leads to increase in income. Many an intervention by development programs increased yield without a corresponding increase in farmers' income. Exposure to ICT and the internet helped participating farmers to translate their increase in yield to a highly significant increase in income. Before the project, the average income among the farmers was about four hundred and thirty seven dollars (\$437). This was significantly increased to an average of three thousand two hundred and eighty five dollars (\$3285) (t value of 15.51). A close look indicates that whereas the farmers were barely making an average of one dollar a day before the project, activities around the internet transformed them to a new bracket where they were making an average of close to 10 dollars a day. Farmers used the ICT and internet facilities to monitor market prices for better market penetration. Constant monitoring of market prices made it possible for farmers to choose a good market for their commodities and demand reasonable prices from middlemen and buyers.

ICT and use of external inputs

Data on the use of external inputs by farmers is also contained in table 1. Use of inputs was measured by taking a ratio of inputs used against inputs recommended. The input of reference in this case was fertilizer. Before the project, farmers in Ago-Are had poor access to agroinputs. Where they were available, the prices were unaffordable. These problems coupled with poor knowledge of how to use them were major disincentives to adoption of external inputs. Some that ventured to use external inputs tried them on their traditional varieties which had low external input use efficiency. However, through the project, participating farmers made use of the internet to monitor the prices of inputs and contact desirable agents to supply the inputs. Buying in bulk made the inputs available to farmers at a discount. Availability of inputs was complemented with the provision of training and training materials on the use of the inputs. Ultimately, the presence of ICT facilities made the farmers to significantly increase their use of fertilizers from an average of 22% of recommended rate to an average of 62% of the recommended rate (t value of 12.27). Increase in the use of external inputs is a veritable indicator of increasing market outlook for a subsistence-oriented farmer.

ICT and farm size

Data on the farm size of participating farmers is also contained in table 1. Like other parameters discussed above, exposure to ICT and internet facilities also significantly increased the farm holdings of participating farmers. Average holding per farmer was significantly changed from 2.22 ha to 3.76 ha after 18 months of exposure to the internet ($p < 0.0001$). This was probably due to the fact that participating farmers increased their incomes and started to have some surplus which was ploughed into expanding their holdings. Like the use of external inputs, expansion of holdings is also an indicator of increased commercial outlook for subsistence-oriented farmers.

Use of ICT and Internet facilities by farmers

Participating farmers in Ago-Are made use of ICT and internet facilities for various reasons. Figure 1 below shows the key uses to which farmers put the ICT facilities.

Figure 1: Use of ICT facilities by Farmers

The major uses include use for market linkages, use for information seeking on best practices, use for the education of their children, use for mails and use for entertainment. Farmers use the facilities mainly for market linkages and to seek best practices for their farming activities. Both accounted for 75 % of total use. The use for entertainment was lowest at 5%. This data showed that participating farmers benefit mostly in the search for markets and best production, and processing techniques for their commodities. This is another index of market orientation. The development is quite understandable because farmers in Ago-Are like their counterparts in other rural

parts of Nigeria lacked basic information on best practices and lacked good access to the market. Since the yields are going up, farmers felt the urge to intensify search for new markets to continue to get the best prices for their commodities. From the foregoing, it may be concluded that the expansion of market access to rural peasant farmers can positively project them towards higher income because it automatically links them to higher income for the little they may have produced. New markets are appreciated when they come through the establishment of contract arrangements.

Sustaining ICT and internet in villages

Sustaining ICT facilities including the internet in rural areas is always a challenge. This is more so in Africa where the cost of internet connectivity is still high. Whereas in the urban center, operators of ICT and internet facilities can depend on patronage on browsing to sustain their facilities, the rural setting lacks such a crop of browsers. Most models on the use of internet have indicated that the running of a side business like including photocopy and typing/word processing services could help defray the cost of sustaining internet facilities, such business have limited patronage in villages.

Figure 2: Cost and revenue at the center

Figure 2 shows the costs and revenue data collected from the center at 3 months interval beginning with month one. The center needed a recurrent cost of \$250 to run on monthly basis and was funded by the donor for six months. In the first month, the center made a paltry sum of \$50 which was far from the cost of running the facilities. The revenue gradually increased until the twelfth month when the revenue doubled the cost. Thereafter, revenue continued to rise steadily.

The ICT and internet facilities were set up in a village with complementary facilities to boost revenue. These included the operation of entertainment video shows for adults and soccer shows for youths. It also set up a snacks bar for income generation. More importantly, the center assisted members to start up enterprises and took check-offs from extra income made from such enterprises. Center also made money from sales of inputs and from rental services operated to make some equipment which are normally above the means of farmers accessible to them.

Figure 3: Sources of revenue at the center

Figure 3 above shows the relative contribution of each source of revenue to the income generated at the center. Browsing contributed the least (5%) while 10% was made from shows. Browsing was that low in spite of the fact that the center made a concerted effort to train people on computer and internet literacy in the first few months. This was just in an attempt to create an army of potential customers for the center. The money made from shows could have been higher if the center was located in the heart of the village. The money made through check-offs from extra profit made from center developed enterprises fetched about 50% of the total income. Revenue made from sales of inputs contributed 20% while that made from rentals contributed 15% of the total income of the center.

From the foregoing, the center made most of its money from activities tied to the economic life of the participants. It could therefore be inferred that tying the establishment of a center with ICT and internet facilities to the economic life of the people can contribute greatly to the sustainability of the operations. For internet facilities to work sustainably in rural areas, it must be operated on a model which involves tying it to agriculture, and using it to increase farmers' income. Farmers must take ownership of it and be committed to sustaining it.

CONCLUSION

A multipurpose community information access point was established at a pilot level in Ago-Are, Oyo State, Nigeria. The center equipped with basic ICT infrastructures including internet connectivity made available through a Vsat provided solutions to the

basic problems of farmers including lack of information on agriculture, lack of access to inputs and output markets, and lack of access to some basic but relatively expensive equipment. The center did not just provide answers, it provided the answers on real time basis through some innovative facilities developed and used.

Participating farmers increased their yields per unit area, holdings, external inputs used, and productivity all leading to higher incomes with attendant evidence of graduation into commercial farming.

Although funding lasted for 6 months, farmers were able to use established facilities to generate sufficient resources to run the activities of the center. In one year, the center was already making 50% more resources than required for general activities in the center.

It could be deduced therefore that ICT and internet facilities complemented with ODL materials have the capacity to transform rural agriculture if delivered sustainably. They therefore hold the key to the agricultural revolution that can solve the problem of African agriculture.

REFERENCES

1. Adekunle A. A. , T.A. Olowu and A. Ladele (2004) Bridging the gap between farmers and researchers, the effect of resource centers on the productivity of farmers in Katsina , Katsina Stste of Nigeria. IITA publication 46pp.
2. Arokoyo, Tunji (2005) ICT's Application in Agricultural Extension Service Delivery. Journal of Agrcultural Extension in Nigeria. Pp245-251
3. George F. Patrick, Gerald F F. Ortmannn, Wesley G. Musser and D Howard Doster (1993) "Information Sources of Large Scale Farmers" CHOICES Third quarter pp.40-41
4. Ma Corazon, Mandoza Lawas and H. A. Lunning (1998) "GIS and Multivariable Analysis of farmers Spatial crop Decision Behaviour" Netherlands Journal of Agricultural Science 46(1998) pp.193-207

Figures

Figure 1: Use of ICT facilities by Farmers

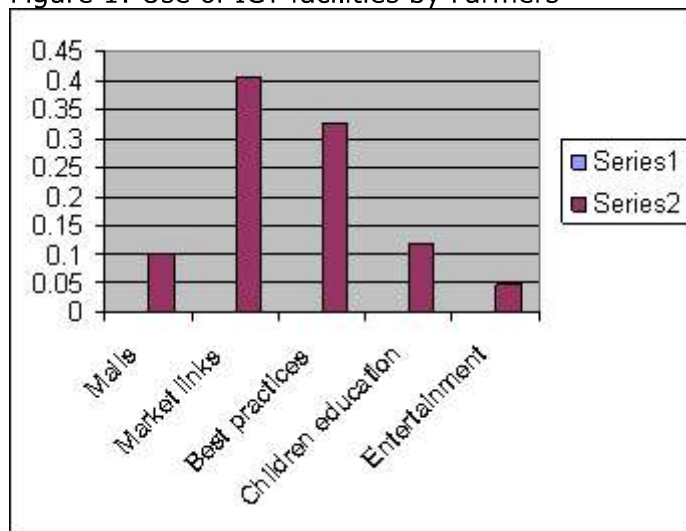


Figure 2: Cost and revenue at the center

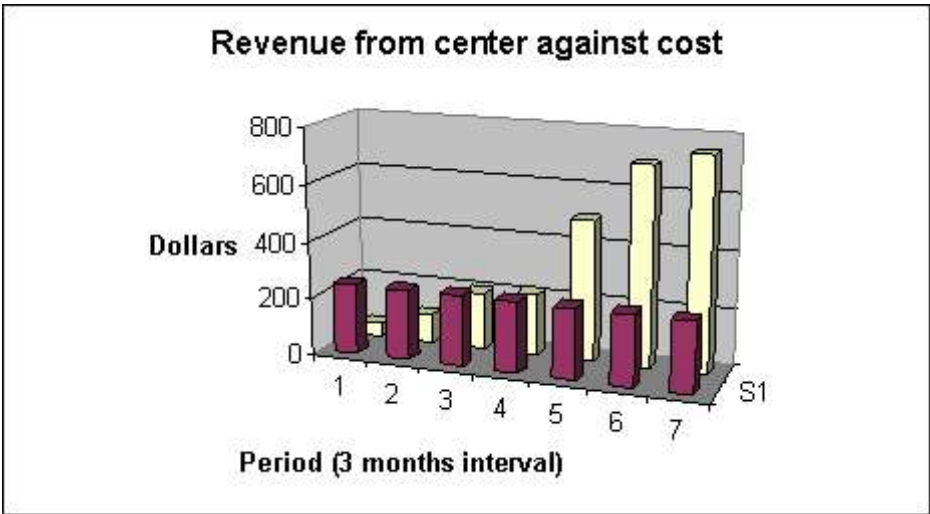
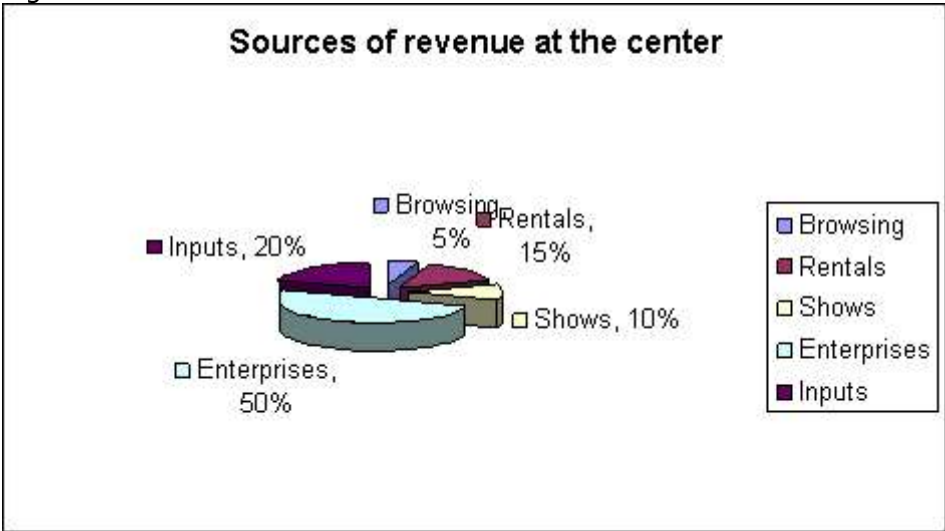


Figure 3: Sources of revenue at the center



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