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# The Multiple Effect of Agricultural Development Programme's (ADP's) Small Plot Adoption Technique (SPAT) on Smallholder Farmers in Abia State, Nigeria

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## ABSTRACT
*This paper determined the multiplier effects of the use of Small Plot Adoption Technique (SPAT) by the Abia ADP on the income of Smallholder farmers in Abia State. The choice of Abia ADP for this research was purposive. A multi-stage random sampling technique was used in the selection of blocks, circles, 300 contact and non-contact farmers respectively from the three agricultural zones (Aba, Ohafia and Umuahia) of Abia State, Nigeria. Instrument of data collection was via three sets of structured and pre-tested questionnaires administered serially from 2000 – 2004. the results show that one Naira (N1.00) investment by Abia ADP in planting materials/seeds and transferred to small holder farmers through SPAT generated N2.80 mean income to the contact farmers and N1.80 mean income to non-contact farmers between 2000 – 2004. The research identified poor rural infrastructure, high cost of composite inputs, and late inputs delivery among others as problems militating against rural smallholder farmers in the use of SPAT. It is therefore recommended that increased political will and support by government to the ADP and introduction of higher level of subsidy schemes on agro-inputs as some measure to motivate the farmers.*
*Keywords: Multiplier, Smallholder, Adoption, Agricultural Development*

## INTRODUCTION
Prior to the inception of the Agricultural Development Programmes (ADPs) in Nigeria, the constraints militating against enhanced production and productivity on the part of the small holder farmers had been identified as little access to credit, lack of improved technology and access to improved inputs, among others (Ayichi, 1995; Ezeh *et al*, 2006; Ezeh and Mbanasor, 2004). Consequently, it was felt that no meaningful increase in production and incomes by the smallholder farmers could be attained without adequate government intervention by way of improved services to the rural sector of the economy. A project approach was therefore though imperative in order to create the environment for production, and as the quickest means of addressing the set of constraints faced by the smallholder farmers. This formed the basis for the ADP strategy in Nigeria (Olayemi, 1980).

The ADP is perhaps the boldest step taken by the Federal Government of Nigeria to develop the agricultural sector. Thus, the ADPs became a central motivational force for direct investment by government on smallholder agriculture (Igwe et al, 1997; Kalu, 2000). This has led to near sufficiency in a number of staple foods in the country since its inception

(Oyaide, 1992). The ADPs were designed to improve the traditional systems of production and raise productivity by transfer of relevant and proven production technologies to farmers, easing constraints on inputs supplies and provision of rural infrastructure (Obasi, 1995; Kalu, 2000).

Strategies for achieving ADP objectives in the crop sub-sector are usually through the employment of On-farm Adaptive under the umbrella of the Training – and – Visit (T & V) system of extension. OFAR is a farmer – oriented and problem solving approach to research, which takes into consideration the small scale farmers' needs and production conditions. SPAT is a practical demonstration of technologies geared towards convincing the farmers of the superiority of the innovation over traditional practices under the farmers' situation.

**Theoretical Framework and Literature Review**

Specifically, this research is anchored on the theory of multiplier concept. This theory states that an increase in autonomous investment is expected to cause income to expand; a decrease in autonomous investment will cause it to contract. Modern income analysis shows that an increase in net investment will increase national income by a multiplied amount greater than itself. Research has shown that multiplier is the ratio of the change in incomes to the initial change in expenditure that brought it about and is given as:

$$K = \frac{\Delta Y}{\Delta J}$$

Where K = Multiplier
Y = Income
J = Autonomous injection (Lipsey, 1985; Samuelson, 1990) and improved resources supplied by the ADP (Ezeh, 1990; Singh, 1990).

The concept of multiplier presumes an estimable change in income of an economic unit being achieved through a change in investment. Direct beneficiaries (contact farmers) and those benefiting through multiplier effects (non contact farmers) are most likely to improve on their incomes (Lipsey, 1985).

Generally, agricultural and rural development constitutes part of an overall development strategy. Hence, the theory of agricultural and rural development is derived from a general theory of development (Ekpo and Olaniyi, 1995). However, due to the peculiar character of agriculture and rural areas, specific programmes and strategies are designed to address the problems of under – development and poverty. The concept of agriculture and rural development embraced by most countries connotes "a process through which rural poverty is alleviated by sustained increases in the productivity and incomes of low income workers and

households" (World Bank, 1975; Ekpo and Olaniyi, 1995). The stress is on increasing output and incomes instead of redistributing current incomes and assets. This is achieved through a deliberate policy of the ADPs where each contact farmer is expected to transfer in the following year, a given proportion of planting materials/seeds earlier received on the SPAT pot to any interested and willing farmer of his choice or return same to the ADP for further SPAT establishment.

It is to document and assess the contribution and influence of this scheme on rural incomes in Abia State, Nigeria, that this study addressed the following specific objectives:

(i) Identified the crop SPAT packages of technology and cropping patterns transferred to smallholder farmers in Abia State;
(ii) Determined the accrued mean value of increased farm investment to each Abia ADP contact farmer 2000 – 2004;
(iii) Compared the effects of adopting improved farm technologies on the mean farm incomes of contact farmers and non contact farmers;
(iv) Identified the problems encountered by farmers in the use of SPAT technology, and
(v) Derived policy recommendations based on the outcome of the research.

**MATERIALS AND METHODS**

Abia State Agricultural Development Programme (ADP) was purposively chosen for this research. The critical consideration was on the basis of its proximity and ability to assess the required information. A list of smallholder contact farmers from the three agricultural zones in the state was obtained from their zonal headquarters at Aba, Ohafia and Umuahia. From the list obtained from each of the agricultural zones, a multi – stage random sampling technique was employed in selecting 100 contact farmers and 100 non-contact farmers, giving a total sample size of 600 farmers. Three sets of questionnaires were used to elicit and collect information on yearly basis. A set was administered on the contact farmers; a second on the non-contact farmers while a third was administered on the ADP staff. The data generated were mostly demographic and those related to input – output coefficients of the improved technologies as well as their prices.

Data in respect of objectives i and iv were analysed using descriptive statistics such as means, frequency counts and percentages while objectives ii and iii were analyzed using multiplier ratios. The multiplier was computed as the ratio of increase in farm revenue (a proxy for farm income) to the increase in aggregate expenditure (investment spending on planting materials) that made the increase possible, which is stated as:

$$\text{Multiplier} = \frac{\text{Change in Farm Revenue}}{\text{Chang in farm investment}} = \frac{\Delta TR}{\Delta I} = \frac{I}{I - C}$$

Where C = MPC or Marginal Propensity to Consume (Lipsey, 1985).

## RESULTS AND DISSCUSSION

The results of the crop SPAT technologies and the cropping patterns are shown in Table 1. The table shows that majority (78.33% for contact farmers and 91.3% for non contact farmers) of the two groups of farmers were engaged in different crop combinations. The most outstanding crop combination pattern in both groups of farmers was the Yam/maize/cassava/melon. This indicates that this particular crop combination is in conformity with the traditional farming system of the farmers. The result (Table 1) shows the increased inclusion of cassava and maize crops in all the crops combination. This underscores the status of these crops as the most important food crop staples in the state. Most farmers predominantly practiced mixed cropping in order to stabilize yield and income. This result is in conformity with the results obtained by Njoku and Odii (1991); and Mbanasor and Obioha (2003) where they affirmed that mixed cropping is the most popular and predominant cropping system among smallholder farmers.

**Table 1: Distribution of Packages of Crop Technologies and Cropping Patterns Among ADP Contact and Non Contact Farmers**

| SPAT Technologies Crop Mixture | Contact Farmers | | Non Contact Farmers | |
|---|---|---|---|---|
| Percentage | Frequency | Percentage | Frequency | |
| Yam/maize/Cassava/melon | 102 | 34.00 | 160 | 53.33 |
| Cassava/maize/melon | 63 | 21.00 | 48 | 16.00 |
| Maize/cassava/cowpea | 40 | 13.33 | 35 | 11.67 |
| Maize/cowpea | 30 | 10.00 | 31 | 10.33 |
| Cowpea (Sole) | 12 | 4.00 | 10 | 3.33 |
| Rice (Sole) | 53 | 17.67 | 16 | 5.33 |
| Total | 300 | 100.00 | 300 | 100.00 |

**Source:** Field Survey, 2004

Table 2 reveals the increased investment flow in the form of seeds and planning materials accruing to ADP contact farmers as supplied by the Abia State ADP Seed yams and cassava cuttings received the highest priority in terms of quantity supplied. This explains the emphasis being placed on these crops by the ADP as the major food staples in the state. The mean monetized net investment was highest in cassava (₦305,500.00) and least in cowpeas (₦110,000.00). The mean investment amount on Cowpea is justified. This is because popularizing of this crop is of recent development by the Abia State ADP and farmers are taking their time in its planting. However, contact farmer average change in investment was 1.61.

The "Farmer to Farmer' multiplier performance is shown in Table 3. The table shows that actual increases in investment on planting materials/seeds were less than expected increase for most crops except melon seed. This tends to reluctance on the part of the ADP contact farmers in releasing the expected quantities of seeds/planting materials to non-ADP contact farmers. It may also imply that the contact farmers were overwhelmed by the commercial imperatives in these improved seed items especially during the planting seasons. Another explanation is that, since there was no reported case of crop failure or attack by natural hazards, the withheld crop seeds may have been saved for future use. This implies that the seed/planting material requirements of most ADP contact farmers were yet to be satisfied.

Inspite of the reluctance of the ADP contact farmers to transfer the desired planting materials to non ADP contact farmers, the scheme was able to increase farm investment to the tune of ₦230,770.00 worth of seed/planting materials. On the average, each farmer made an increased investment on seeds/planting materials to the tune of ₦770.00. This value in itself is a modest economic empowerment and poverty alleviation measure.

**Table 2: Accrued Farm Investment on Planting Materials Supplied by Abia ADP To ADP Contact Farmers 2000 – 2004**

| Seed/Planting Materials | Individual/ Private Farmers | ADP Sponsored | Net Investment | Value of Net Investment (₦'000) |
|---|---|---|---|---|
| Cassava (bundles) | 936 | 2158 | 1222 | 305.50 |
| Seed yam | 113 | 3368 | 2250 | 112.50 |
| Okra seed (kg) | 12 | 30 | 18 | 9.00 |
| Maize grain (kg) | 75 | 166 | 91 | 23.66 |
| Melon seed (kg) | 6 | 14 | 8 | 1.60 |
| Cowpea seeds (kg) | 9 | 31 | 22 | 1.32 |
| Rice paddy (kg) | 150 | 450 | 300 | 30.00 |
| Change in investment | | | | 483.36 |
| Per Farmer average change in investment | | | | 1.61 |

Source: Field Survey, 2004

**Table 3: "Farmer to Farmer" Multiplier Performance of Food Crop Planting Materials Distribution**

| Seed/Planting Materials | Expected increase with project | Actual increase | Investment values of actual increase (₦'000) | Per Farmer Percentage |
|---|---|---|---|---|
| Cassava (bundles) | 611.0 | 350.0 | 87.50 | 57.28 |
| Seed yam (number) | 1125.0 | 337.5 | 16.88 | 30.00 |
| Okra seed (kg) | 9.0 | 6.0 | 3.00 | 66.67 |
| Maize grain (kg) | 45.5 | 38.68 | 10.06 | 85.00 |
| Melon seed (kg) | 4.0 | 4.00 | 0.8 | 100.00 |
| Cowpea seed (kg) | 11.0 | 8.8 | 0.53 | 80.00 |
| Rice paddy (kg) | 150.0 | 112.0 | 112.0 | 74.67 |
| Change in investment | | | 230.77 | |
| Per Farmer average change in investment | | | 0.77 | |

**Source:** Field Survey, 2004

Table 4 compares the influence of the scheme on the average annual revenues of the ADP contact farmers and non-ADP farmers. The table shows that ADP contact farmers (primary beneficiaries) earned more revenue than the non-ADP contact farmers (secondary beneficiaries). The improvement in the aggregate revenue was ₦1,372,800.00 for the ADP contact farmers and ₦425,000.00 for the non-ADP contact farmers. Thus, while each contact farmer beneficiary improved his mean annual revenue by ₦53,600.00; each non-ADP contact farmer beneficiary improved his mean annual revenue by ₦21,480.00 during the periods under study.

**Table 4: Average Contact Farmer and Non contact Farmer Revenue Status from Planting Materials/Seeds by Crop Enterprise 2000-2004**

| Crop Enterprise | Contact Farmer without ADP (₦'000) | Contact Farmer with ADP (₦'000) | Farmer to Farmer without ADP (₦'000) | Farmer to Farmer with ADP ₦'000) |
|---|---|---|---|---|
| Cassava cuttings | 25.13 | 36.00 | 15.53 | 18.00 |
| Seed yam | 19.65 | 31.88 | 13.50 | 16.03 |
| Okra seeds | 9.79 | 16.13 | 5.75 | 9.05 |
| Maize | 14.70 | 2.00 | 9.03 | 9.90 |
| Melon | 8.10 | 10.88 | 5.50 | 6.28 |
| Cowpea | - | 6.08 | - | 4.03 |
| Rice | 97.37 | 150.97 | 60.81 | 82.29 |
| Improvement in seed revenue | | | | 21.48 |
| Aggregate improvement in crop revenue | | | ₦1,372,800.00 | |

**Source:** Field Survey, 2004

Table 5 shows the computed values of the multiplier of ADP supplied inputs among the ADP contact and non-contact farmers in Abia State. The multiplier is the ratio of the total revenue generated (as a result of investment) to the permanent change in the flow of investment that brought it about. Thus, the multiplier is the ratio of total revenue generated to the project sums invested.

Table 5 shows that one Naira (₦1.00) investment on improved planting materials/seeds by the ADP given to farmers under SPAT has generated a ₦2.80 revenue to "Contact farmers" and ₦1.80 to the non ADP contact farmers (Farmer – to – Farmer Distribution). Pooling the mean revenue of both groups of beneficiaries (Contact and non contact farmers) shows that ₦1.00 invested by the Abia ADP on improved inputs to farmers have created extra ₦1.60 revenue. The Marginal Propensity to consume (MPC) is 0.6. With an MPC of 0.6, the tendency is that the multiplier will be greater. This is because the greater the extra consumption re-spending, the greater the multiplier.

**Table 5: Estimated Multiplier Ratios of ADP Planting Materials Seeds Distribution Among the Contact Farmers and Non-Contact Farmers in Abia State, Nigeria 2000 – 2004**

| Category of farmers | Change in Farm Revenue | Change in Farm Investment | Multiplier Ratio |
|---|---|---|---|
| ADP Contact Farmers | 1,372.8 | 483.6 | 2.8:1 |
| Non ADP Contact Farmer (Farmer – to Farmer) | 425.0 | 230.0 | 1.8:1 |
| Total | 1,797.8 | 714.37 | 4:6:1 |
| MPC | | | 0:6 |

**Source**: Computed from Table 2, 3 and 4

The problems encountered by the ADP Contact and non-Contact farmers in technology transfer process are shown in Table 6. The table reveals hat both groups of farmers suffered from such endemic problems as poor rural infrastructure, high cost of composite inputs, late input delivery, insufficient funds, inadequate farm labour and insufficient market for the produced goods in varying degrees. This result reinforces the result obtained by Kalunta (2000) that effective participation of the smallholder farmers in ADP activities was hindered by similar problems.

**Table 6: Distribution of the Problems of the farmer in Technology transfer Process**

| Category of Problems | ADP Contact Farmer | | Non ADP Contact Farmers | |
|---|---|---|---|---|
| | Frequency | % | *Frequency | % |
| Poor rural Infrastructure | 100 | 33.33 | 110 | 36.67 |
| High cost of composite inputs | 150 | 50.00 | 93 | 31.00 |
| Late input Delivery | 80 | 26.67 | 160 | 53.33 |
| Inadequate Funds | 121 | 40.33 | 65 | 21.67 |
| Inadequate Farm Labour | 45 | 15.00 | 60 | 20.00 |
| Insufficient market for the Produced goods | 125 | 41.67 | 100 | 33.33 |

**Source:** Field Survey, 2004

## CONCLUSION AND RECOMMENDATION

Insipte of these constraints, the results generated in the course of this research have produced sufficient evidence that the SPAT system of technology transfer to small holder farmers has made some noticeable and quantifiable impacts in terms of its multiplier effects on the income of the farmers. What is required is to building on the gains and ensure the sustainability of the system. This can be achieved through the following recommendations:

(i) The government should exhibit stronger and increased political will be supporting the ADPs through increased budgetary allocation.

(ii) Government should introduce higher level of subsidy of farm inputs such as fertilizers and herbicides so that these inputs will not only be available but affordable by the resource poor farmers.

(iii) The farmers should form co-operative societies to enable them to pool their resources to purchase these inputs thus enjoying unrestricted economies of scale and also increase the eligibility of the small holder farmer to institutional support.

(iv) Rural infrastructures such as roads, electricity, water and telecommunication should as a matter of deliberate policy be rehabilitated where available or constructed where not available. This is due to the positive and favourable multiplier effects of the facilities on the producers and consumers.

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