Ife Journal of Agriculture, Vol. 12, Nos. 1 & 2 1990

A Comparative Analysis of the Costs of Production and Producer Prices of a tonne of Cocoa from matured trees in Nigeria before and during the Structural Adjustment Programme (SAP)

A. J. ADEGEYE
Department of Agricultural Economics
University of Ibadan
Ibadan.

Abstract

It has been very difficult in the past to determine the costs of production of cocoa, because of the various factors involved. Early attempts made assumptions that are no longer tenable. On field estimations were carried out and results showed that pre-sap, the Nigerian Cocoa Farmers were making losses up to the 20th year if cocoa is considered as sole crop. But if intercrops are considered, losses occur till the 10th year. The gains from the period to the 30th year are also marginal. When costs of maintenance and hence production of a tonne of cocoa are compared pre and post-sap era, it was found that while costs of production increased by 300%, producer prices increased by over 800%. The question is, are the gains of SAP on cocoa farmers going to be in the short-term alone and what are the effects of allowing open market prices to operate for the cocoa trade?

Our conclusion is that SAP can only help the cocoa farmers in the short-run. In the long-run he has to face even higher input costs and hence lower profits.

Introduction

In Nigeria, cocoa is grown mainly in the forest areas. These areas include, Ondo, Oyo, Ogun, Bendel, Cross River and Akwa Ibom States. The three states of Ondo, Oyo and Ogun produce over 90% of all cocoa exported or utilized locally(6). Cocoa was for many years the main foreign exchange earner for Nigeria. Even now it is the second most important foreign exchange earner after oil.

There are two issues of interest to us in this paper; these are the costs of production and the producer prices. It is normally held that prices paid for commodities should reflect costs of production. In case of cocoa there seemed to be no correlation between the two for many studies have estimated costs of production of cocoa inorder to guide policy makers in determining fair prices to producers which it is hoped, all things being equal, can influence the farmers' decision about increase in cocoa production. On the other hand, other factors were usually considered in determining producer prices. These include the world market prices, the need for surplus fund to finance development and the political situation in the country. The government also considered the possibility of stabilising the producer prices in order to safeguard the farmers from the variability of world market prices.

Considered very carefully, the cost of production was not considered as a problem before the civil war and the oil boom. This was because the cost of production relative to revenue obtainable was very favourable and also because most inputs were provided by the farm family and there were subsidization of chemicals at least to some extent.

But the two factors mentioned above and particularly the oil boom, caused an increase in labour costs which constitute more than 70% of costs on matured cocoa farms. The traditional sources of labour to the cocoa belt, i.e. the Eastern States and middle belt of Nigeria could no longer provide labour. Education also made many to turn to urban areas which meant loss of family labour. Old age of farmers reduced their ability either to maintain or establish new farms. Costs of chemicals also began to rise and all these led to the concern about costs of production.

Galetti, Baldwin and Dina (1956) were probably the first to determine the costs of cocoa production in Nigeria. They noted that there was a whole range of labour costs of production according to whether maintenance and harvesting are more or less intensive. Other costs like spraying chemicals and fertilizers were not considered because they were not important then. Most of their costs estimates were mere guestimates as it was difficult to determine production costs in a system of mixed cropping.

The establishment of farm settlements in the 60's gave the first attempt at realistically estimating the costs of establishing new cocoa farm. It was around the same time that Government had to subsidize cocoa chemicals when it was seen that cost of production was rising faster than producer prices. Again it was clear that the estimates of farm settlements showed cost of production of improved practices not on peasant holdings.

Due to illiteracy among peasant farmers coupled with inadequate extension services, it has not been possible to date to determine cost of production among small scale (peasant) farmers. One can however assume that cocoa production was profitable in the past since production still continued. Infact, Olayemi (1972) reported high relative returns to cocoa in the main cocoa growing areas of Nigeria.

However it was later discovered that after the oil boom, many only continued in production because there was no immediate alternative. Those who could afford new ventures abandoned their farms and hence it became urgent to determine cost of production in face of declining cocoa production in Nigeria compared with other cocoa growing areas of the world.

Early attempts at estimating costs of production always laid emphasis on new planting. Now the focus is on replanting, rehabilitation as well as new planting and these imply different costs. These early attempts had a lot of contradictions. FAO (1966) maintained that replanting costs are about 38% higher than costs of new planting. The Western State Ministry of Agriculture and Natural Resources (1972) showed that new planting costs are about 32% higher than rehabilitation or replanting costs. That is a contradiction of the FAO 1960 report. The contradiction came as a result of the different assumption used. For instance, FAO assumed that in replanting, there will be "Clearing and stumping of old trees and removal of all ground cover" (FAO 1966). Hence FAO labour requirements for land clearing and planting in the case of new planting — 168 mandays/hectare and 269 mandays/hectare for rehabilitation are not realistic.

While FAO estimated 59 mandays for weeding one hectare the MANR 1972 estimated about 11 mandays. This difference is too significant to give any

reasonable guidance. This of course may be dué to the definition of mandays which to some extent may be aribitrary and imprecise. The variations in costs may be the result of intercrops.

The need for on the field estimation of costs of production

Even though on the spot estimation of work done on cocoa fárms is the best way to estimate costs of production, it is almost impossible to do a cost-route estimation of its production since cocoa is a perennial crop. There is however still the need for any costs of production to reflect actual farming operations and farmers' activities on the field.

Farm settlement and government farms cannot provide good estimates because of overstaffing in some cases. The same arguments go for the State Cocoa Development Units.

There is also the need to distinguish between small, medium and large scale production because of their various resources requirements and hence different costs of production. Any estimates meant to give guidelines for investments in cocoa development must consider the various sizes of farms. Costs of production will almost vary with whether it is a peasant farm, medium or large scale or plantations.

Methodology

The long gestation period before cocoa starts fruiting as well as the length of time when cocoa trees fruit, means that there must be a waiting period which will result in some problems in determining the cost of production. The extent of the intercropping done, the grace period for loans, the location of farms and even the breeds of cocoa used are factors that will affects costs of production.

Hencc field evaluation approach is chosen, as one can identify on-farm problems relating to production costs. From these estimates as base, a comprehensive cost build-up over the next three or four years can be undertaken.

Designing of Questionnaires

Five questionnaires were designed to collect information on costs of establishing cocoa nurseries.

(1) Costs of establishing a hectare of cocoa up to fruiting year.
(2) Costs of maintaining a hectare of cocoa during fruiting years.
(3) Cost of harvesting and processing of cocoa during fruiting years.

Information required to convert costs per hectare to costs per metric tonne were embodied in the questionnaires.

Sources and limitation of data

In all, the first survey conducted in 1983 covered 86 farms in nursery establishment, 133 in establishment of cocoa to fruiting year and 203 for maintenance of cocoa from 5th year.

Due to the illiteracy among the peasants, there were bound to be some errors in estimation of farm sizes, work done per day, labour use but the large random

sample was to take care of the many variations. The samples were related to the importance of each state in the production of cocoa.

The survey covered, Ondo, Oyo, Ogun, Kwara, Bendel, Imo, Akwa Ibom and Cross River States. However the 1988 figures were based on visits to the major cocoa growing areas of Ondo, Oyo and Ogun states and were mainly concerned with increases in input prices.

TABLE 1: NUMBER OF COCOA FARMERS INTERVIEWED, STATE BY STATE AND BY PHASES IN PRODUCTION

State	*Nursery Establishment and Maintenance*	*Establishment of Cocoa (up to fruiting year)*	*Maintenance of Cocoa from 5th year*
Ondo	25	35	65
Oyo	20	31	53
Ogun	15	25	30
Bendel	1[1]	10	18
Imo/Cross River	20	10	18
Kwara	4[1]	10	18
Total	*86*	*133*	*203*

[1] *There were hardly any private nurseries in those states.*

Source (6) 1983.

Scope of study

Though the main study from which this paper is derived, took a comprehensive view of the costs of production from establishment to maturity and to over 30 years, the paper is concentrating in estimating costs of production for matured trees. The varieties studied are mainly the Amelonado and the Amazon. For costs of nursery, maintenance to fruiting years, interested readers should consult the main report. N.C.B. (1983) and Adegeye (1988) on SFEM and Agricultural prices. Specifically the paper is considering costs of production of a tonne of cocoa in order to see the effects of the Structural Adjustment Programme on costs of production and produce prices.

Cost of production of a tonne of cocoa Pre SAP era in Nigeria

To estimate the cost of producing a tonne of cocoa, the estimates from the different sections are added. However the costs associated with nursery establishment and maintenance have been omitted as allowance has been made for the purchase of

seedling in the first three years of establishment of cocoa farms.

Components of costs

The main work (6) contains the detailed costs according to operations. For this paper, the component of costs are related to (a) establishment of a hectare of cocoa in the first year and these include, cost of land, clearing and stumping, lining, pegging, holing and interplanting of shade trees, costs of cocoa seedlings, plantain suckers, transplating, weeding, pruning, fertilizer including transportation, fertilizer application, spraying chemicals labour cost in spraying and depreciated value of spraying pumps and other materials used in spraying. (b) to maintain one hectare of cocoa from the 5th year which include operation specific to farms to that age and includes most of the costs under establishment. The third aspect is cost of harvesting and on-farm processing and marketing of cocoa from the 5th year. This includes, harvesting completely ripe cocoa, transporting pods to point of extraction, breaking and bean extraction, fermentation, drying, jute bags, transporting dry beans to point of sale. The costs from these sections are aggregated to give the results presented.

The costs given here refer to two categories of cocoa production. When cocoa is produced as a sole crop and when it is produced with intercrops.

The yield estimates as obtained from the survey (6) was 447.5 kilograms per hectare* and this is used for 5th to 10th year and 21st and 30th while a yield estimate of 500kg is assumed for 11th to 20th year.

Cost of producing a tonne of cocoa when grown as a sole crop

This is obtained by summing all costs of production during the thirty years of useful lives of the trees. In this situation three different types of costs are arrived at.

These are the costs of producing a tonne of cocoa in the first 10 years, 20 years and in all 30 years.

1. *Cost of producing a tonne of cocoa in the first 10 years*

   Total cost of producing per hectare from the first year to the 10th year — ₦7,744.46
   Yield from cocoa for 6 years = 2.65 tonnes
   Cost per tonne $\frac{₦7,744.46}{2.65}$ = ₦2,922.44

2. *Cost of producing a tonne in the first 20 years*

   Total cost of production from 1st to 20th year ₦14,873.95
   Yield from cocoa = 7.65 tonnes for 16 years.
   Cost per tonne $\frac{₦14,873.95}{7.65}$ = ₦1,944.31

* The yield estimates were obtained from the field survey and the figure given is the average for seven states covered.

3. *Cost of producing a tonne in 30 years*

Total cost of production from 1st to 30th year ₦22,003.45
Yield from cocoa 12.07 tonnes for 26 years.
Cost per tonne ₦22,003.45

$$\frac{\text{₦22,003.45}}{12.07} = \text{₦1,822.99.}$$

At the pre-sap prices of ₦1,600 per tonne, the farmer was making in the producing of cocoa if grown as a sole crop losses, the losses are as follows.

Up to the 10th year — ₦1,322.40
Up to the 20th year — ₦344.31
Up to the 30th year — ₦222.99

These estimates refer to situations when cocoa is grown as sole crop. But since there are usually intercrops, the manignitude of the losses can be much lower.

Cost of production of a tonne of cocoa where there are intercrops

Before fruiting and at the early stages incomes can be earned from crops such as yam, maize, cocoyam, plantain and others. Even at maturity, kolanuts and sometimes coconuts, provide additional income, which looked upon would reduce cost of production of cocoa since some of the cost estimates can be bone by both crops and cocoa. For all the crops, plantains have been used as proxy. The plantain's are expected to yield an average of 100 bunches per annum per hectare for a period of 29 years.

An average selling price of ₦2.00 per bunch has been assumed.

1. *Cost of producing a tonne in the first 10 years:*

Total cost of production from first year to 10th year — ₦7,744.46
Yield of cocoa = 2.65 tonnes for 6 years,
Plantain bunches 900 at ₦2.00 each = ₦1,800
Cost per tonne of cocoa 7,744.46 — 1800 = 5,944.46 =

$$\frac{5,944.46}{2.65}$$

₦2,243.26

2. *Cost of producing a tonne in the first 20 years:*

Yield of cocoa 7.65 tonnes for 16 years.
Plantain bunches 1900 at ₦2.00 each = ₦3,800.00
Cost per tonne of cocoa ₦14,873.95 — 3800

$$\frac{\text{₦14,873.95} - 3800}{7.65}$$

= ₦1,447.58.

3. *Cost of producing a tonne in 30 years:*

Total cost of producing of cocoa from 1st year to 30th year ₦2,2.003.45
Yield of cocoa is 12.07 tonnes for 26 years
Plantain bunches, 2,900 at ₦2.00 each = ₦5,800
Cost per tonne $\frac{₦22,003.45 - 5,800}{12.07}$ = ₦1,342.46

At the producer price of ₦1,600 per tonne, the farmer was making the following losses or gains.

Up to the 10th year — ₦643.26 Loss
Up to the 20th year — ₦152.42 Gain
Up to the 30th year — ₦257.54 Gain.

Losses are still made up to the 10th year, even with intercrops. Gains of ₦152.42 up to 20th year are made and ₦257.54 when we consider the whole useful lives of the cocoa trees, yield of 300kg/ha were used in the past. With this, on no account will anybody be able to make any gain in cocoa production.

One may then ask why people still continue to produce with these 'estimated' losses? This is very simple. Most producers do not worry about the investments that have been tied down in establishing the farms. What was normally done was to compare the maintenance costs with producer prices. Most farmers do not even cost their own labour!!

As discussed, some derive income from growing yams, kolanuts, oranges etc. on cocoa farms and these add to their income. Others infact engage in hunting and in craft during the off season.

We have used yield estimates of between 400 and 500kg per hectare but yields of 1000 to 1500kg per hectare are possible under a well managed system. It is only under this condition of increased yields that any cocoa farmer can expect to cover his cost of production.

It must be noted that costs pre-sap took into considering the subsidy on spraying chemicals. Without these subsidies it may have been impossible for many farmers to continue production. As a foreign exchange earner, it was thought then that the society could bear some or part of the cost of production if only to encourage its continued production.

Despite the additional income from other sources, it was clear that the prevailing conditions pre-Sap were such that many farms were being abandoned due to increasing costs of labour and other inputs. The solution seemed to be in higher produce prices.

The abolition of Commodity Boards in 1986 and other conditions in the SAP programme brought cocoa trade into the open. This enabled farmers to receive higher producer prices.

But before we compare these with pre-Sap prices, we should try to estimate what are the costs of production of a tonne of cocoa after SAP was introduced. Since the period of SAP in less than three years, the cost estimates can only refer to the matured cocoa trees. The estimates will be based on maintenance, harvesting, drying, storage and transportation of cocoa beans. Looked at critically the costs associated with cocoa production at the matured stage are mainly for labour which

constitute about 70% of cost of production. Other costs of herbicides, fertilizers constitute about 10%.

Cost of production of cocoa after the introduction of SAP

Here we will only discuss costs of maintenance of existing cocoa farms, since the price incentive has enabled most farmers to bring into production more cocoa farms by merely weeding and carrying out of normal cultural practices. The total cost of maintaining a hectare of cocoa before the introduction of SAP was ₦942.75.00. The major items of costs were chemicals, fertilizers, tools and labour for weeding, prunning spraying and harvesting. All these operations are still being carried out after the introduction of SAP. Table 1 shows a comparative analysis of these costs, while Table 2 shows the net revenues from cocoa in both periods. Table one shows that while cost of producing a tonne of cocoa pre-Sap was ₦942.75 per hectare, it rose to ₦3,697 post-Sap. This is an increase of about 300%, over the pre-Sap era. Also note that there was a little improvement in the production per hectare as a result of better management.

For instance, all inputs were applied at higher rates. Fungicides, insecticides, fertilizers and labour were all affected. Though in case of fungicides and insecticides, the use rates are still below what Cocoa Research Institute (CRIN) recommended for farmers. Even when costs have risen by 300%, Producer prices have risen much higher. From ₦1,600 to ₦15,000 an increase of over 800%!!!

This is the one crop which supporters of Structural Adjustment Programmes have been citing as being the main success of the programme!!

In addition, cocoa farmers have started replanting. There is no doubt that there are short-term gains in the introduction of SAP on the income of cocoa farmers. But the long-run effect is what cannot be easily predicted. For instance in 1989, costs of herbicides, fungicides etc. and other equipment have doubled the 1988 prices. What it means is that, old cocoa farms can be rejuvenated but it would be prohibitive to establish new farms with these present input prices and bank rate of over 20%.

Sometimes one need also to consider the exchange rates pre and post sap as well as world market prices for these products. When these are related to the producer prices, it was discovered that pre-sap the farmer was getting 63% of world market price while in 1988 the farmer was receiving as much as 80% of world market price, a great improvement!!

TABLE 1: PRE AND POST SAP COSTS OF MAINTAINING A HECTARE OF COCOA

Cost Item	*Quantity Used Per hectare 1985*	*Quantity Used Per hectare 1988*	*Average Unit Price ₦(1985)*	*Average Unit Price ₦(1988)*	*Cost ₦ 1985*	*Cost ₦ 1988*
Fungicides	6.45kg/ha	8.40kg/ha	17.80	50.00	114.81	420.00
Insecticides	4.78lit/ha	6.00lit/ha	15.20	45.00	77.44	270.00
Fertilizers	3 bags/ha	5 bags/ha	10.50	15.00	31.50	75.00
Depreciated value of land tools.	—	—	—	—	21.50	32.00
Labour for Weeding and pruning	36 mandays	45 mandays	7.50	25	270.00	1125
Labour for spraying	19 mandays	24 mandays	7.50	25	142.50	600
Labour for harvesting	38 mandays	47 mandays	7.50	25	285.00	1175
Total Cost					*942.75*	*3,697*

Source: Dittoh J.S. and Adegeye A.J. 1988

* The 1987 figures have been revised for labour.

TABLE 2: PRE-SAP (1985) AND POST-SAP (1987) NET REVENUES FROM COCOA

	Average Yield tonnes/ha.	*Price per tonne ₦*	*Gross Revenue*	*Nominal net revenue*
Pre-Sap 1985/86	0.450	1600	720.00	-222.75 (a loss)
Post-Sap 1987/88	0.520*	15,000*	7,800	4103 (Gain)

*Post-SAP yields are higher as a result of better management.

Source: **Dittoh, J.S.** and Adegeye, A.J. 1988. The producer price used was the average for the year **88/89 season.**

Discussion

Many fundamental issues are involved in this analysis. First, is how far has SAP affected the agricultural sector? Are the present gains of cocoa farmers likely to continue? Why do exporters pay more than the world market prices in some cases. Are the gains going to be effective on the long-run? Or is it only in the short-run?

What effects do post SAP prices have on the quality of product? (For instance many tonnes of cocoa exported were rejected by overseas buyers).

Will a centralised body for marketing the cocoa not be better than free for all system? How far has the system encouraged capital flight?

Will the post-sap prices enable the local cocoa industries to operate? This is not likely as most of the industries cannot afford to buy at the prices at which some exporters are prepared to buy cocoa.

On the other hand those who export cocoa, mostly foreigners are looking for ways of transferring their money out of Nigeria.

The Nigerian cocoa farmers are gaining in the short-run and may lose in the long-run. The Nigerian Government is losing in the short-run and may lose in the long-run except it accepts to continue the organization of cocoa marketing to enable the foreign exchange earned go into the government treasury.

By and large and even with the variability in prices of cocoa from day to day, there has been within two years, an improvement in the production of cocoa. We only hope that the farmers can benefit in the long-run when present rehabilitation and planting schemes mature.

References

Dittoh, J.S. and Adegeye, A.J. (1988) "Is there a structurally adjusted induced boom in the Nigerian Cocoa Industry" — *Paper presented at the 1988 Nigerian Economic Society Conference, O.A.U. Ile-Ife.* 3rd to 7th May, 1988.

Galetti, et al. (1956) Nigeria Cocoa Farmers Oxford.

Olayemi, J.K. (1972) "Some economic characteristics of Peasant Agriculture in the Cocoa Belt of Western Nigeria" *Bulletin of Rural Economic and Sociology.* Vol. 7 No. 2.

F.A.O. (1966) "Agricultural Development in Nigeria 1965-1980.

Western State of Nigeria: MANR. Resource Surveys 1972.

Nigerian Cocoa Board Costs of Production of Cocoa and Coffee in Nigeria, 1985.

Adegeye, A.J. (1988) The Structural Adjustment Programme and Agricultural Prices — *Mimeo Department of Agricultural Economics University of Ibadan.*