

# ON THE TOTAL IRRELEVANCE OF COST-OF-PRODUCTION FIGURES FOR SUBSISTENCE AGRICULTURE<sup>1</sup>

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## ABSTRACT

It is argued that even if perfect figures could be obtained on production costs for subsistence agriculture, they would be of virtually no value for key decisions such as national pricing policy. Indeed it is difficult to think of any decisions they could be used for.

However, even the best figures that can be obtained on the quantity of inputs used are very bad indeed, to the point of being meaningless. There are difficulties in measuring land and labour, especially with intercropping.

There are insuperable conceptual problems in valuing labour inputs, and it is little easier to value other inputs. Marketing costs add to the problems.

The variances in both quantity and value of inputs are so great that extremely large samples would be required for any degree of accuracy, and this would be prohibitively expensive.

Collecting costs of production is very expensive, not least in scarce manpower. In one country there are a large number of enumerators collecting data and 37 agricultural economists analysing it with a host of clerks and a battery of computers, while there is one single economist working on national price policy – which does not make use of the costings.

## INTRODUCTION

From time to time governments all over the world are under pressure to fix prices that "cover costs of production". Pressure comes from farmers, politicians, even on occasion the World Bank. Economists have argued that this is based on a misconception of what costs really are, and also that it would cause enormous harm to the economy if countries did try to do so. It will be shown here that these misconceptions are particularly serious in a country where most production is for subsistence.

I ask first what decisions could legitimately be influenced by any set of cost of production figures for subsistence and peasant agriculture. I then

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examine whether it is possible to collect a set of cost of production figures which is meaningful for such decisions.

I have never seen any cost-of-production study which recognizes these problems, or which tries to manage them. As is often the case, a little hard analysis before starting a project would result in abandoning the project before one started.

#### WHAT DECISIONS COULD THESE COSTINGS INFLUENCE?

In most developing countries a parastatal sets a price at which it will buy food crops like rice or maize, or export crops like coffee and cocoa. To the farmer it seems that the price should always be set high enough to cover costs of production and leave him something over, a normal income. To the administrator it may seem that it would be unnecessary, or even in some way morally wrong, to pay the farmer a price higher than this.

Both these views are immediately shown to be wrong if one looks at a temperate crop like strawberries being grown in an equatorial climate. They could certainly be grown there, though yields would be low, and it might be necessary to cover them against the rain, or even to install air-conditioning to simulate winter. Could one really justify paying the farmer the full production cost, perhaps 1000 leones or shillings a pound, when the consumer will only pay 10 leones a pound? Is it not better that the country should concentrate on those tropical fruits in which it has a comparative advantage, and which it can produce at a price that the consumer can afford to pay?

Rice is a staple food, not a luxury like strawberries, and it may seem that the farmer must be paid enough to cover his costs if he is going to continue to produce<sup>2</sup>. However, it is not as simple as that: some farmers have higher costs than others. It may cost one farmer Le100 a bag to produce, and another farmer Le200, with the cost of the average farmer being Le50 (and, as will be shown below, this is a gross oversimplification). The main reasons for the differences are likely to be of land, marketing costs and technical efficiency.

If the parastatal price were to be set at the average cost, Le150, about half the farmers would find that the price did not "cover their costs", so they would stop producing. (The decision process of a subsistence producer is in fact much more complex than this would suggest.) The result is a scarcity,

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<sup>2</sup> For convenience I refer to the farmer decision maker as he. In many societies women are the decision makers, especially for arable crops and subsistence crops. Several women may be independent decision makers in one household.

and a market price well above the parastatal price, which is then ignored. If, on the other hand, Government sets the rice price high enough to cover the costs of the high-cost producer; at Le 200, it will pay all farmers to produce.

However, the low-cost and average-cost producers will have a very strong incentive to increase production. Abandoned swamps will be reclaimed, new swamps will be developed, and farmers will increase inputs of labour, fertilizer and improved seed. (Note that the most economically efficient farmer is not the one who produces at the lowest cost, but the one who makes most money, increasing inputs until the marginal cost equals the marginal revenue. This again, is a simplification, ignoring factors like risk reduction, food security, value of time etc.) The result of this will be increased production in the short run and increased investment for the longer term. In the long run there will be huge surpluses, and the parastatal will make massive losses if they buy the rice, and cause serious political embarrassment if they do not. The problems are not confined to developing countries: the USA had similar problems when trying to pay farmers 1914 parity prices.

When the parastatal is the monopsony buyer of an export crop, and it sets the price at the average cost, half the farmers will find it uneconomic to produce. There will be a serious decline in production in the short run, and an even bigger one in the long run. If, on the other hand it set a price which would cover the cost of even the highest cost producer, the lower-cost producers would expand their production. In much of sub-Saharan Africa the export parity price is several times greater than the official price for export crops: the farmers are very heavily taxed. Higher prices could easily be paid.

Paying the farmer in relation to his costs instead of paying him the export parity price means that he is using the wrong technologies. It means that he cannot afford to use fertilizers, herbicides or pesticides, or more efficient bulk fermentation techniques. At higher prices he would spend a lot more per acre, but he would get higher yields and better quality.

Since Government intervention does not cover all crops, it distorts production, encouraging farmers to grow crops more profitable than cocoa when the export crop's "average cost of production" is below the parity price. Alternatively, it can mean that they switch to rice, because its state-controlled price is high and known in advance, and abandon crops like cassava, which are not marketed by parastatals.

It is surprising that so much attention is given to average costs, given that economists use marginal costs for most analysis. For example, it is of little interest to know how much it costs to produce enough food for consumption. It is of a great deal more interest to know how much it would cost to produce a surplus for sale. This may mean hiring labour instead of

using family labour with zero opportunity costs. It may mean buying fertilizer, improved seed and sprays; it will mean incurring marketing costs.

Often, in fact, we are more interested in a supply curve than an average cost, and it is not possible to derive an industry supply curve, or even individual supply curves from the sort of data that are ever likely to be available in most developing countries. Even if we were interested in measures of central tendency, the cost per bag of the average farmer would be of no interest compared with, say, the cost of production of the median bag. This implies that the normal sampling design would be wrong.

A further complication is that different technologies may be used for food for sale and food for own consumption. In Sierra Leone, for instance, it is broadly true that upland rice is produced for own consumption, while swamp rice may be produced for sale. This means that the cost of production of upland rice is irrelevant to most marketing decisions. Average costs for all rice are meaningless. For different purposes we might be looking for the average of marginal cost of the average farmer, or of the improved farmer, or of the intensive farmer, or of farmers in different ecologies.

Paying "cost of production" has a circular effect. To a very large extent, the price of rural labour in the least developed countries is set by the price of the staple food. The higher the price of rice, the more costly the food given to labourers. The higher the price of rice, the more people will pay for labour at harvest, when most hired labour is employed. Accordingly, each time Government increases the price of rice, labour costs will rise (at least they will if the normal methods of calculation, which are criticized below, are used.) and farmers will demand price rises to meet these costs of production. This effect is particularly strong with subsistence agriculture, because nearly all costs are labour costs, which rise in this way, unlike, say, machinery costs.

In the very poor countries, again, an increase in the cost of food has a very high impact on the cost of living of urban workers, and has an inflationary effect.

A variant of the cost-of-production approach that is particularly disastrous is that of having the same prices everywhere in the country, regardless of where the demand is and regardless of the cost of marketing it. This policy has crippled the Tanzanian economy and has been a serious strain on the Zambian economy. It has meant that food crops were not grown where they were needed, next to the cities, but in the most distant areas, where transport was expensive and limited to the dry season. As a result, Tanzania spent more on transporting the grain than on producing it - and transport is a foreign exchange cost. Its grain marketing board notched up enormous cumulative losses amounting to 40% of the national debt. At the same time,

the policy meant that the high-value, transportable and exportable crops like tobacco, coffee and cotton which could be grown profitably in remote areas declined, so less foreign exchange is earned to pay for the transport.

While it may be national policy to achieve self-sufficiency and boost farmers' income, this does not necessarily, or even normally, mean "covering farmers' costs". There is a confusion between ends and means.

## **HOW DO WE MEASURE INPUTS?**

Inputs must be measured before they can be costed. How accurately can this be done?

### ***Land***

First one must measure the amount of land used. This is possible, but time-consuming, with crops like swamp rice. With upland rice it is extremely difficult to measure the odd-shaped fields, and impossible if one is to allow for the fact that the rice may be intercropped with cassava, sesame, and okra. In a way, the tree stumps of a slash and burn system may also be thought of as intercropping, especially if firewood is a crop, as is increasingly common nowadays.

Tree crops like coffee and cocoa are often scattered at random throughout the holding, and where they are concentrated in a field there may still be intercropping - bananas and cocoa for instance. With palm trees there is the added complication that the trees may be wild trees growing in the bush.

It is convenient, but not always valid, to work out tree crop costs on a per-tree basis, ignoring such complications as the apparent equivalence between young and old, bearing and non-bearing, wild and hybrid, and ignoring the impact of inter-cropping and weeding on yield.

The quality of the land, both natural quality and quality after investment, is also relevant, affecting both opportunity cost and the labour input per unit of output. It is possible to measure this, but I have never heard of it being done with a routine cost-of-production.

### ***Labour***

Next comes the problem of quantifying the labour content. If one could have an enumerator with a stopwatch for each individual in the household, noting

the time spent on each crop, one could, no doubt, get some sort of figure, though one would still have the problem of identifying the area of ground each labour input was applied to. The expense of this is prohibitive and the boredom of the job would make it probable that most of the figures were faked. Visiting a household even once a week is impractical in most of the least developed countries. It would, in any case produce very poor data: in a village where few people own watches and no one works office hours, recall of time is poor; hard work would be thought to take more time (but then calorie consumption rather than time might be the constraint). The paterfamilias would consider five hours of his own time to be the same as 17 hours of his wife's.

Allowance must be made for the fact that land clearance in year one continues to bear results for each year until the land is finally left to go fallow (though it is probably safe to ignore long-term rotational effects). The allocation of this input between subsequent crops would be arbitrary.

With tree crops one must charge the time spent on planting and nurturing the tree for the first five or six years to the twenty years when it is in full bearing.

It is not enough to note the hours spent on each crop: one must note whether it is a man, woman or child who does the work. To some extent, and for some jobs, they are interchangeable with two ten-year olds being equivalent to one man. However, there are some man's jobs which no child can do, and in most cultures a man does not do a woman's job. Differences in age and fitness are also relevant. Recording all this would enormously increase the costs of the survey. However, there is an enormous range of types of labour and mixes of labour for a given crop as one goes from farm to farm.

This enormous variance means that a truly enormous sample would be needed to get reasonable accuracy - and even then we would only be getting some sort of meaningless average.

### ***Other Inputs***

With other crops the main problems of quantification are finding out which fields the fertilizer or pesticide were applied to, how big they are, which crop in an intercropped field benefited, and what was the carryover of fertility from one crop to the next. It is common, for instance, for farmers supplied with fertilizers and insecticides for their cotton cash crop to use them for their maize crop – survival comes before cash. They are reluctant to admit this to

government employees. With tools and machinery there is also the question of whether to charge them as overheads or to attempt to divide the benefit among all the different enterprises they are used for, which is not conceptually straightforward.

### ***Overheads***

One can, sometimes, ignore overheads and talk only of gross margins, but not if the intention is to pay a price which will "cover cost of production", and not if one is dealing with a heterogeneous population, with farmers having different production systems and different overheads.

## **COSTING THE INPUTS**

I have argued elsewhere that cost-of-production figures for commercially-grown crops, particularly horticultural crops, in developed countries are largely meaningless. (Bowbrick, 1976) If one knows all the inputs used by a farmer, one can calculate his costs, but, by taking different ways of calculating the costs of the land, labour and capital and the costs of marketing, one gets a wide range, with one cost being 2.7 times as high as the other. Which costs, if any, should be used depend on the decision to be made. This applies even more to subsistence agriculture.

### ***Land prices***

In most LDCs very little of the land is freehold and can be bought or rented as it can in Europe. In those areas where it can be, one might consider using rent as a proxy for land value. However, all the problems that arise in Europe arise here too. In addition, one usually finds that so little land is put into the market that the price reflects not the productivity of land but the marginal return of a handful of farmers growing very high value crops, or, more likely, the status to be gained from being a landowner, or the development value of the land.

Where there is some form of tribal ownership, there may be no market for land, and it is tempting to ignore it. If one does though, the variances in the other inputs will rise sharply, meaning larger samples are needed, but also meaning that the figures are of doubtful value.

## **Labour costs**

In most LDCs nearly all agricultural production is by subsistence farmers. Elsewhere, there may be a commercial plantation sector as well, but still no peasant sector, with farmers producing mainly for sale. With both the subsistence sector and the peasant sector labour is the main input and the main cost. Accordingly, the calculated cost of production depends very much on the value put on the labour.

The fact that there is no labour market for subsistence farmers means that one cannot use a wage rate as opportunity cost, as you might with industrial workers or labourers on a commercial farm - though even here the use of casual labourers causes serious conceptual problems.

Wage rates in the city, or even wage rates in foreign countries, may be the true opportunity cost, as studies of the Malawi tobacco industry have shown. (I pass over factors like improved health and health services, social costs and benefits and the probability of getting a job.) However these rates apply only to adult males, and to those who go to the city permanently. They cannot be taken to be the opportunity costs throughout the year.

Farmers do employ casual labourers at peak periods, but again this wage rate cannot be applied to all labour inputs through the year. The demand is high because of the high marginal return at peak periods, while the supply on the market is low because farmers have to tend their own land. The subsistence farmer who takes up employment in the harvesting season may be abandoning all the crops he planted, so he will want a very high wage to compensate. The market is thin, and a small change in supply or demand could cause wages to fall sharply. In fact, the market ceases to exist in the slack season, and opportunity cost falls to zero.

In some societies a substantial part of the payment made to casual workers is the meal they are given, or the beer supplied. In calculating the cost of this it should be remembered that the quality of the food is not the same as that marketed in town - e.g. it may be fresh, upland rice rather than year-old swamp rice which fetches a much lower price. On the other hand it has incurred no marketing costs. The price of the rice will be vastly different if it is an exporting area or an importing area.

Similarly, the value of the rice to the farmer is not constant. The first bags, up to subsistence level, have a very high value indeed, because they mean the difference between life and death. The next bags mean the difference between hunger and satisfaction, and the next ones mean money with a declining marginal utility. Which value is appropriate depends on the analysis being done. In a money economy in a developed country it is

reasonable to talk only of prices, not values, and to measure the value by opportunity cost. Farmers in subsistence economies do not have that luxury, and it would be foolish to try and construct a theoretical model of a market that does not exist.

Farmers often exchange labour. A farmer will get a group of his neighbours to help him; and then he will join the group on the next farm. Again, a good meal must be provided for the workers. Certainly the person-days are part of the inputs, but it is questionable whether the meal is part of the cost. Since the farmer gets the same number of meals from his neighbours, it may be thought of as his normal consumption.

For many purposes the relevant opportunity cost is the marginal productivity if the labour was switched to another crop. Again, this will vary from time to time.

For children there is no opportunity cost outside the farm. One can think only of return to labour on other crops. The farmer may consider the return from schooling to be a profitable long term investment, but one could hardly build this into a cost-or-production study. At times there will be a zero opportunity cost. Similarly, women have fewer alternative occupations available than men.

For these reasons, one can quite validly use labour costs of anything between zero and the marginal return at harvest at different times of the year. One cannot validly use the same cost for all operations. Similarly, one cannot validly use the same cost for different farmers who have different types of labour and different opportunity costs.

The role of women depends on the society. They may just be one part of the family labour pool, or they may be part of the family labour pool for cash crops like cotton. Sometimes they are the main decision makers, or the main decision makers for arable crops, or subsistence crops. In polygamous societies, each wife may be a separate entrepreneur, running her own farm. All of which makes the concept of the price of labour conceptually difficult.

### ***Other Input Costs***

At first sight the cost of other inputs is easily worked out, once one knows the quantities used on each crop (though, as shown above this is not easily found out).

What price per bag do you use for fertilizer though? It is tempting to use the official Government price. However, it is unlikely that the farmer will have paid this price. He may have had to pay a bribe to get the fertilizer at all,

or he may have been cheated and it is virtually impossible to get him to admit either to a government enumerator. Cases have been reported of people paying three or four times the official price.

Many LDCs have an inflation rate of over 100% and others have in addition a very large fall in the exchange rate between their currency and the dollar several have experienced a tenfold fall over a year. This means that there is an enormous difference between the cost of the fertilizer at planting and the cost at harvest, the difference forming a major part of the farmers profit if he buys it on credit. Similarly, there may be a big difference between the local currency price of output at the beginning and end of the season. It is tempting to value all inputs and outputs at a single point of time, though not always possible. At first sight this seems valid for some purposes, though it means ignoring the farmer's decision processes. However, the conceptual problems are enormous, and it is questionable whether they are surmountable even in theory. In practice data problems and the non-availability of economists who have sufficient technical skills to tackle the problem, and who can find nothing better to do with their time, mean that the problems are insurmountable.

Inevitably, there are delays between the collection of the raw data and the publication of the processed information. With a rapidly changing economy this means that costings are obsolete when they are published. Even the physical inputs may be irrelevant – a big rise in the price of fertilizer will result in a fall in use.

These problems with credit, inflation and a falling currency mean that one could argue forever on the appropriate discount rate for tree crops and slash and burn agriculture.

### ***Marketing costs***

The marketing costs are, of course, part of the cost of production, though they are usually left out of cost-of-production studies to simplify them (quite rightly for some purposes. (Bowbrick 1976) In subsistence agriculture particular attention has to be given to transport from a remote farm to a buying point, whether by headload, oxcart or truck.

One cannot ignore them because they determine the value of land and the techniques and intensity of production. Indeed, high marketing costs may make it uneconomic to produce surpluses.

However, there are so many variants on the marketing system that an enormous sample would be needed to draw any conclusions. This would be so even if prices at the buying points were uniform and steady.

## **CONCLUSION**

It is concluded that production costs for subsistence agriculture are of no value whatsoever for agricultural price policy and marketing. It is virtually impossible to quantify the inputs, and actually impossible to value them. Even if one could do so, they would not give any useful information.

Extraordinarily large samples would be needed to get any degree of accuracy on the quantity of inputs. However, even a small sample costs more than is typically spent on high payoff economics like price policy.

## **REFERENCES**

Bowbrick, P., "Errors in horticultural cost-of-production surveys", Irish J. of Agric. Econ and Rural Soc. 6:21-9, 1976