CHAPTER V

COST AND PROFIT ANALYSIS

GENERAL INTRODUCTION

When we deal with the production costs of natural rubber, we usually take into consideration two main types of cost. There is:-

1. Revenue cost per lb. which corresponds approximately to direct operational costs, and includes, the up-keep of mature trees, tapping and collection of latex, manufacturing at the factory level, general charges (including estate supervision, housing and other indirect labour costs) and packing and despatch charges.

2; Total F.O.b. cost per lb. which is currently referred to as the "revenue cost plus". This includes in its calculation the export duty depreciation of buildings, machinery transport and depreciation of trees, general overall company adminstration and selling costs - all of which represents the total f.o.b. costs up to the Malayan port.

Other types of cost which may be included in any profitability assessment depends upon the nature of the estimation. For instance, landed costs in London, would thus, require additional ocean frieght, insurance and landing charges, amounting to a very recent estimation to 6 cts. per lb. (15).

Basically we cannot pin point the exact costs of production per lb. of natural, since firms may vary in their expenditure on their estates. The only solution to such a problem is only possible when one analysis the cost by the weighting system of costs of a number of companies, and a mean group cost is thereby extracted. Since I could not have access to such figures, I shall base my analysis on the information provided by experts (16) in this field.

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(15) Dr. Westgarth, R. Narayanan: "The Effect of Rubber Price & Yield per Acre on Estate Production Cost" R.R.I. Journal Volume 18, 1964.

(16) Dr. Westgarth, R. Narayanan: op. cit.

However, to clearly understand the situation of costs per lb. we must accept the fact that administrative and selling charges are more or less regarded as constant, and that the depreciation cost which is based on a fixed depreciation value per acre will decrease with increasing yield per acre.

With regard to the cost of labour, we must make a differentiation between daily paid workers according to the MPIEA wage scheme and those not directly connected with the NUPW or other wage schemes. The payments may range from cash payments to payment in kind as is often referred to by many as the "bagi dua" system. However, my analysis does not take into account those directly connected with the MPIEA wage agreement which offers a guaranteed daily wage dependent upon the prevailing rubber price, bonuses for poundage etc, but on the mean monthly estimated figures given by the Department of Statistics, in Kuala Lumpur.

The consideration of costs here are more or less aligned with constant cost figures - all of which are the means of their various cost groups as has been computed by many experts in this field. For the first part of my calculations, I shall choose to ignore price changes which may automatically reflect changes in the various cost groups, or other economies or diseconomies which may set in during prolonged periods of fluctuating prices - to facilitate a simple understanding of the nature of such costs.

COST OF PRODUCTION

The figures given in this example are all approximates of the national changes incurred. (17)

a) Depreciation of building, machinery and transport.
Assume a fixed value of $400 per acre depreciated at 7½ percent per annum.

b) Depreciation of trees.
Assume a replanting cost of $1,000 per acre depreciated at 4 percent per annum, and the trees have an economic life of 30 years.

c) Assume that the average acreage operated per tapper is 8.75 acres. Here assume that the mean production after 7 years is 1,200 lbs. per acre.
Thus, the mean production per tapper per annum will be 10,500 lbs..

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(17) Dr. Westgarth, R. Narayanan. (1964).

d) From the total revenue cost assume the breakdown of revenue costs into the following:-

upkeep and cultivation	13%
general charges	25%
manufacturing	11%
Packing and despatch	4%
Total percentage of revenue cost	53%

e) Assume that the estate size is 1,000 acres.

f) Assume the payments of wage on a monthly basis of $86.00 (18) per month.

g) Assume an average of 150 tappers[19] are employed on each 1,000 acre estate.

EXAMPLE I.

Cost of depreciation of fixed assets.

$$= \frac{400 \times 7\frac{1}{2}}{100} = \$30 \text{ per acre}$$

Replanting cost $1,000 per annum depreciated at 4% per annum

$$= \frac{1,000 \times 4}{100} = \$40 \text{ depreciation per acre per annum.}$$

Tapping costs on a monthly basis with 150 tappers working at a wage of $86.00 per month.

Therefore, tapping costs per annum
= 150 x 86 x 12
= $154,800.

Other costs, include the breakdown of percentage totals (d) from yearly tapping costs
= $174,652 per annum.

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(18) Rubber Statistics Handbook, 1961.

(19) This is a mean figure extracted from the Rubber Statistics Handbook, 1961.

Therefore, total yearly costs of operation,

Yearly depreciation of fixed assets (30 x 1,000)	30,000
Yearly amortization of rubber trees (40 x 1,000)	40,000
Yearly tapping costs (150 x 86 x 12)	154,800
Other yearly expenses	174,652
total	$399,452

Mean yearly production figure
= 1,200 lb. per acre.
Therefore, cost of production per lb.
= $\frac{399,452}{1,200,000}$ which is approximately

= 1/3 or 33.34 cts. per lb..

EXAMPLE II.

If replanting is in the nature of quarterly intervals, and that there is a mean percentage of immature yearly, the figure for cost per lb. would be entirely different. In this second example, we shall assume 25% immature that is, ¼ of the 1,000 acres is unproductive in the year of operation.

Total yearly production of rubber
= 750 x 1,200

= 900,000 lbs.

Costs per lb. (assuming the other factor costs constant) will be $\frac{400,000}{900,000} = \left(\frac{4}{9} \times 100\right)$

= 44 cts. per lb..

EXAMPLE III

With a present situation of 25% immature and rubber production at a mean of 913 lbs. per annum, then the figure would be:-
Total yearly productive yield
= 913 x 750

= 684,750

≏ 700,000 lbs. per annum.

Therefore, cost per lb.

$$\frac{400,000}{700,000} = \frac{(4 \times 100)}{7} \text{ cts. per lb.}$$

57.1 cts. per lb..

EXAMPLE IV.

With a very efficient firm it has been calculated that for a thousand acre estate 114 tappers are employed, payable at a monthly wage of $86.00 per month.

Therefore, tapping costs = 114 x 86 x 12

= $107,648 per annum.

Tapping costs also influence other expenses since it covers approximately 47% of the revenue costs.

Therefore, total costs of "other expenses"
= $132,552.

Taking all other cost figures to be constant -

Total costs of operation per annum,

Yrly. depr. of fixed assets	= 30,000
Yrly amortization of rubber trees	= 40,000
Yrly tapping costs	107,648
Other Yrly expenses.	132,552
	$310,200

With 913 lbs. to an acre and with 25% of the total estate acreage immature,

total production in lbs.
= 913 x 750

= 684,750 lbs. per annum.

Therefore, costs per lb.

$$= \frac{310,200}{684,750} = 45.31 \text{ cts. per lb..}$$

It must be borne in mind that all these cost estimates do not take into account the various types of economies which may be encountered, like the effect of size of estates, on costs, yield and costs, factor economies, etc.. Neither do they take into consideration factors which may offset such a productive scheme like pests and other collaterals which mayhave adverse effects upon the productivity

and flow of latex from the trees tapped. The examples given are, thus, hypothetical illustrations of the national costs per lb. incurred by an estate of 1,000 acres size.

From such cost fugures estimated, we can determine the profit per lb. (or otherwise) of rubber at the existing market price. However, to get an overall representation of costs, we shall take the mean or average of all the four estimates. The figure 44.93 cents per lb. will determine how much profit can be made at the current market price. If the price quoted was 50 cts. per lb., then a profit of 5.07 cts. per lb. is made for every lb. of rubber produced. This is an oversimplication as in Example III where the cost comes to 57.1 ct. per lb., there would actually be a lost of 7.1 ct. to every lb. sold. The profitability of production will, therefore, depend very much on the costs per lb. incurred by the firm under consideration.

According to very reliable sources an average yield schedule of rubber productivity with modern material has been given as:-

1st year of production	500lb. per acre
2nd year of production	800 lb. per acre
3rd year of production	1,000 lb. per acre
4th year of production	1,200 lb. per acre
5th year of production	1,300 lb. per acre
6th year of production	1,400 lb. per acre
7th-18th year of production	1,500 lb. per acre
19th year of production	1,400 lb. per acre
20th year of production	1,300 lb. per acre
21st year of production	1,200 lb. per acre
22nd year of production	1,100 lb. per acre
23rd year of production	1,000 lb. per acre.

From this schedule of productivity, we can calculate the profits per year of operation throughout the economic life span of the rubber tree.

If the price of rubber is assumed to be 50cts. and that the cost per lb. is assumed to be the average of the four examples at 44.93 cts. per lb., then the profit per acre for all the years can be illustrated by Table 5-1

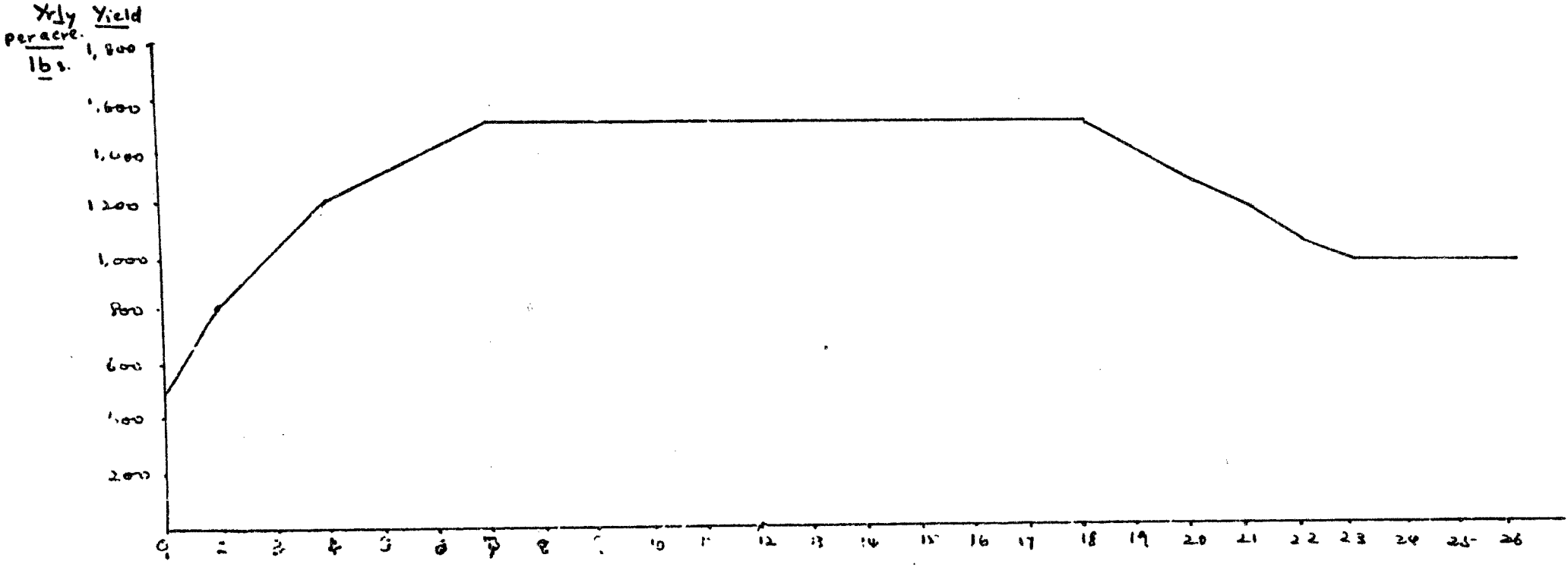

Figure 5. Graphic Presentation to Show Rubber Yield Throughout its 26 years of Operation.

TABLE 5-1

THE PROFITABILITY OF RUBBER PER ACRE WITH PRICE AT 50 CENTS AND COST 44.93 CENTS

Year of Operation	Yield (lb. peracre)	Price Cts.	Cost	Profit $
1st	500	50	44.93	25.35
2nd	800	50	44.93	40.56
3rd	1,000	50	44.93	50.70
4th	1,200	50	44.93	60.84
5th	1,300	50	44.93	65.91
6th	1,400	50	44.93	70.98
7th-18th	1,500	50	44.93	76.05
19th	1,400	50	44.93	70.98
20th	1,300	50	44.93	65.91
21st	1,200	50	44.93	60.84
22nd	1,100	50	44.93	55.77
23rd	1,000	50	44.93	50.70

The average yield from the schedule is 1,300lbs. per acre. Therefore, the profit per acre would be $65.91 when price is 50 cents per lb. and cost 44.93 cts. per lb. with a thousand acre estate, the profits would be $65.910 per annum.

Therefore, profitability of production can be determined, therefrom.

THE EFFECT OF PRICE MOVEMENTS ON PROFITS

In the discussion of price profit relationship for rubber production, price movements are generally the

determining factors, not only for profits but also for costs. However, though the cost of production has no role in price-fixing, there is in Malaya a tendency for changes in cost to lag three months behind changes in price, with consequent effects on the profit trend. These changes in cost have been particularly so with the MPIEA wage agreement where the wage rates are tied to the price of rubber according to a sliding scale related to the price in the preceding three months. Thus, in a period of rising prices, profits tend to rise more steeply because of such cost schemes, and when prices fall the proportionate fall in profits is greater.

It is especially important to note that costs of production vary with different sizes of estates and efficient utilization of the productive factors - through the effective co-ordination of management, labour, plant and machinery, and other cost items directly or indirectly connected with the production process.

For those high cost producers, the cost of production is an important factor in determining profits particularly in years when costs are relatively high. There is a marked difference in output between producers, basically, since the functional relationship of size and differences in productivity may give rise to various degrees of efficiency and quantum produced. With the use of regression equations, we can indicate profitability with output if we take a sample study of various company sizes and variability in productive efficiency. The regression equations if calculated accurately will show that unit profits tend to increase with output, but such effects may or may not be negligible each depending on the factors in force.

It must be stressed here that cost equations have their own limitations, since when new measures are taken to offset the situations prevalent, costs yields and total output may be markedly different.

Despite such limitations of the cost equations as an accurate means of forecast, they do provide a measure of the economies which must be made by the various producers if they are to remain profitable in times of low prices. However, it can be generally accepted that a producer who is yielding 1,000lbs. per acre can sustain a substantial fall in the price for a longer time than the one who produces at 500 lbs. per acre. Thus, the higher yield producer will be in a stronger position in relation to the lower yield producer to any price fluctuation and in event of the entrance of various types of competitive forces.

AN ANALYSIS THROUGH THE THEORETICAL VIEW POINT

Since each firm is producing a homogeneous commodity rubber, it is faced with a perfectly elastic individual demand curve. Theoretically, where there is a perfectly competitive market, firms will produce at the most efficient output where marginal cost is equal to average total cost and both are equal to marginal revenue or price. There are, however, obvious obstacles to the free entry of new firms into the rubber industry. In a sellers' market marginal revenue or price will be raised to a level above which marginal cost is equal to average total cost at its minimum point. In order to maximize total profits, the output of the existing firms will tend to expand until the cost of producing an additional unit is equal to its price. Such internal expansion is limited by the size of the estate but output will nevertheless be maintained at a point where average total cost is rising and marginal cost greatly exceeds the former. Other things being equal, there will be a tendency for an increase in output to be accompanied by an increase in average cost and this tendency is strengthened by the large ratio that variable costs bear to fixed costs in rubber production.

EFFECT OF PRICE MOVEMENTS ON PROFITS AND COSTS

It must be borne in mind that the rubber industry is similar to our theoretical analysis of the concept of a firm. Although we may be unable to have exact costs representations for the various fixed and variable costs of production for the rubber industry, yet some kind of an overall estimate of costs is needed to fulfil the needs of profit maximization with the current price. A definite cost line is rather difficult to derive, but if all the costs of the whole rubber industry were available for assessment, then by statistical deduction or calculation by the process of the mean, an overall estimate may be available to compare it with the cost analysis involved in the study of the concept of a firm. Of course such a derivation would be extremely difficult but by no means an impossibility.

Rubber producers also make use of the "break-even" analysis to show relative costs to relative prices and therefore, relative profits. A fall in price will, like the theory of a firm, either make the producer produce more or reduce his costs of production. As we all know, the production of natural rubber is limited by its short run inelasticity to price changes. When faced with such a situation, the producer, therefore, cuts down his tapping costs since they are the more variable of all costs involved in its production. By this means the producer is able to introduce "resting-periods" at the same time reducing tapping costs to meet any low price.

However, in the reduction of tapping costs, we have to bear in mind that it is only with relatively high yielding estates that the loss in yield through less intensive or extensive tapping is less likely to offset the saving in tapping costs.

However, this is not the only means of a reduction in costs. Other methods which have been constantly recurring in rubber news are:-

1) a wider use of yield stimulants.
2) change in the task size.
3) selective tapping to tasks.
4) selective tapping of trees within tasks.
5) various economies - e.g. in upkeep, general charges etc..

The most effective of such suggestions may be the change in the task size since it is not only possible but very practical. By increasing the task size, where possible the productivity per tapper is clearly increased and therefore, tapping costs per lb. is reduced. This process may, however, have some adverse effects on yield per acre due to later tapping.

Selective tapping is not practical where prices are low because the profitability of such a process varies according to yield per acre. At low prices, therefore, some of the trees may remain untapped. Although the possibility of cost reduction can be met with an increased task area for variable material and selective tree tapping, the extra walking per tree especially with very spaced trees is unlikely to make this measure worthwile except when the price is exceptionally low.

Nothing substantial and effective can be done with regard to alterations in the upkeep and general changes. The reduction in staff may make the industry understaffed and thus may not be able to be run efficiently. Minor reductions may be possible but any major reductions in current average expenditure on upkeep and supervision may be of doubtful value on a long term basis.

In times of rising prices, profits may be obtained quite easily. Long term low prices may mean an introduction of a new scheme of tapping and production methods. There may be a change in the co-ordination of factors especially where effective automation can take the place of manual productivity.