CHAPTER III

AN ANALYSIS OF THE SUPPLY ELASTICITY OF NATURAL RUBBER.

In order to understand the real problem, natural rubber has to face, we must have a clear understanding of the facets which make up the industry. In this way, the determinants of price is important as the natural rubber industry will,in the near future,be competing on such a basis. It is this, that knowledge of the forces which determine price should be understood.

The price of rubber,as it is, is subject to wide fluctuations - the chief determinants of which are the supply and demand of natural rubber. A study of the market which rubber has to compete in will, therefore, involve a closer scrutiny of the factors which make up the price, namely supply and demand.

SUPPLY FACTORS

The factors which make up the supply of natural rubber can be discussed under the following:-

1) The elasticity of production
   a) of small-holders and
   b) of estates.

2) The elasticity of export supply and

3) Other determining forces.

However, from the practical point of view, in order to determine the supply of rubber within a certain period, other factors like the number of mature and immature trees (or acreages of trees in operation)the efficiency of production, the type of trees or clones (high yielding or otherwise) and a host of other factors must be taken into account.

For this reason, therefore, the above factors governing the supply of rubber need modification and appropriate qualification. It would be more realistic to fore-cast the supply of rubber within a certain period through the analysis of acreages, percentages of mature and immature high yielding and other species of rubber trees, the extent of replanting undertaken and so on. This will, therefore,be dealt with later in the chapter. We will, therefore, come back to our theoretical aspects of supply.

ELASTICITY OF PRODUCTION

Economists generally agree on the relative short-run inelastic nature of rubber production. Unlike industrial manufacturing productivity, the elasticity of natural rubber is not governed by a number of productive machineries, but by the availability of productive trees existent at a certain period of time. An increased production of rubber can only be realised through intensive tapping and increasing the acreage of new plantings which would only take up to the long run aspect of natural rubber production, since a number of years will have to be foregone before actual production can be realised. Therefore although high prices may create incentives for investment into the industry, the element of uncertainty cannot be unduly ignored.

According to recent research the short-run elasticity of rubber production, it has been recently estimated that the elasticity of smallholder production was in the range of 0.12 to 0.47. Point estimation on a monthly basis was the method used. For estate production using annual figures, the elasticity is less than 0.2 taking into account price lags of seven years. (6)

This rather low elasticity probably explains to a significant degree the volatile movements of rubber prices.

The physical character of the production process is explained by the observed rigidity - since at any moment of time, there exists only a given number of trees. This explains that the variability production can be attained in a limited number of ways:-
   a) By changing the method of tapping (e.g. varying the number of cuts as in slaughter tapping).
   b) By changing the frequency of tapping.
   c) By varying the number of trees tapped.
   d) By shifting out of production of rubber altogether into other occupations.
   e) By applying yield stimulants.

In addition, the stock of trees is a long term feature because rubber trees take approximately five to seven years to come into tapping, and moreover, it has an economic life of

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(6)   Francis Chan Kwong Wah: "A Preliminary Study of the Supply Response of Malayan Rubber Estates Between 1948 and 1959".

Malayan Economic Review Volume VII No. 2, October, 1962.

some thirty to 35 years, which in turn yields varying quantities of latex annually through its productive life.

Other considerations are that production responses to rubber prices vary between estates and smallholdings, because costs of production between the two similarly vary.

ELASTICITY OF SMALLHOLDERS' PRODUCTION

Out of an approximate total of three and a half million acres of rubber trees, 1½ million acres come under smallholdings production which is approximately 42.5 percent of the total contrubution to the Malayan Rubber output. Thus, the factors governing elastic or inelastic smallholding response to price stimuli will have an important ultimate bearing on the aggregate production response of Malayan rubber.

Many Economists seem to hold the idea that the smallholder production schedule is more elastic than estates in view of the possibilites of alternatives like shifts from rubber to rice production, or to palm oil and other crops. They thus, ignore the very fact that such possibilities may be prevented from being materialised in view of the fact that shifting cultivation on the same given piece of land is both expensive and not always technically possible. Rubber smallholders, as asserted by many developmental authorities, produce on a subsistence basis and high prices are seldom an incentive to increased activity. Such general conclusions need qualifications however. But from the general overall point of view, smallholders have very limited capital to augment any significant change. Other prevailing factors which act against such presupposed relative elasticity of smallholder production are the seasonal, institutional and technical factors which have to be taken into account too.

The factors which govern price inelasticity of production can be summed up as follows:-

    a) Monopsony and marketing factors
    b) Supplementary Sources of Income
    c) Subsistence Response.

a) Monopsony and Marketing Factors

The factors making for the existence of monopsony and oligopsony situations at the first buyer level of smallholder rubber may also cause price inelasticity. Smallholders may be forced to produce at a certain rate or price which is in a way beneficial to the monopsonist, even though more attractive alternatives are open because:-

    1) they may be in debt to the monopsonist

ii) they may rely on the monopsonist for essential supplies or

iii) they may have to maintain the "goodwill" of the monopsonist in view of future transactions, and so on.

b) Supplementary Sources of Income

Supplementary activities besides the tapping and processing operations, like poultry rearing, fishing, handicrafts, and the like, may generate additional sources of income making for the inelastic nature of smallholder production. However, this factor is difficult to assess in the view of the fact that data is difficult to obtain, since the extent and degree of their supplementary activities is difficult to assess.

c) Subsistence Response (7)

At times of low and declining prices, the economic activities may be likely to be subdued. It is, therefore, conceivable that alternative employment or sources of income may be difficult to obtain, thus, entailing a difficulty to sustain his subsistence standards. In order to maintain his own economic standards, even at a stage of declining prices, instead of reducing output, he may increase it to meet his minimum needs.

CONCLUSIONS DERIVED

The conclusions derived therefrom would be:-

1) Technical factors of production point to a rather inelastic response, at least, in an upward direction. There is a physical limit to the number of trees tapped and the method frequency and the intensity of tapping of the trees.

2) Production response at times of low prices would depend on alternative production, employment and supplemental opportunities available. It is also likely that in a depression, production from smallholders would increase rather than decrease. As mentioned above, there is a physical maxima to such an increase. However, it is true that the more limited the alternatives and the greater the range and profitability of supplemental activities, the less elastic would be the aggregate response.

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(7) T.H. Silcock "Economy of Malaya" page 22, 1954 (Singapore, Donald Moore).

3) Accuracy of measurement of statistical or empirical measurement of elasticity of small-holder response is handicapped by a number of factors, especially statistical accuracy and the coverage. The effect of the "Emergency", the transfer of mature acreage, and the effects of age on changing yields, are some of the factors which are difficult to compute.

4) The degree of monopsony factors is difficult to assess and not empirically verified.

5) Varying stress on effort, capital accumulation and other physiological as well as psychological responses may conceivably affect the pattern of smallholder production response.

6) There may be different notions of subsistence altogether as different levels may be advocated by different communities at different times too.

All these factors point to the inelastic nature of smallholder production response to price changes.

ELASTICITY OF ESTATE PRODUCTION

From empirical studies, costs of production and other technicalities involved in estate production make the production pattern responses to price more inelastic than that of smallholders. Supply rigidities may be due to other factors besides, but owing to the importance of overhead costs which play a very prominent role in the production process, the other factors must be considered as of secondary importance.

The response to price movements is, therefore, very limited due to the fact that estates carry a very high proportion of fixed overhead costs in relation to their total production costs as compared to smallholders whose overheads may be comparatively negligible. It is because of the long term contract system of estate labour that labour expenses may be termed as fixed since the "trouble of disbanding and recruiting" labour in times of fluctuating prices may not justify their being so. However, the term "fixed" in such a context needs qualification since it is debateable that if prices should fall very low estate labour and production may be curtailed.

It is, however, the general belief that estates tend to follow a steady long term tapping and production policy.

Variability in size and estate ownership also attribute different pattern of response to the production process as well as, give different adherence to tapping and replanting in view of changes in price and the market structure. It should be of interest to note that in 1960, European estates accounted for 70.7 percent of total estate output and that during the same year estates with the size of less than 1,000 acres accounted for 79.7 percent of the total estate output. (8)

Generally, managerial and tapping programmes of European owned estates are more attuned to long run factors rather than to temporary short-run changes in price. Therefore, such estates would have a rather inflexible response to short-run prices of rubber and their dominance in total estate production would make for a rather inelastic aggregate estate production response.

Two factors which are generally overlooked statistically in the computation of estate production elasticity to price changes are:-

    a) Long term manufacturing contracts
    b) "Production-consumer" relationship.

Very frequently data on long term manufacturing contracts are difficult to obtain and compute, and the fact that estates may enter into long term supply contracts to manufacturer at certain denominations make production irresponsive to market price changes.

Moreover, some of the largest estates here are owned by the raw material consumers themselves. For example, Dunlop estates account for nearly 80,000 acres of total Malayan estate acreage. Thus, production is influenced more by own physical needs than to market prices.

Therefore, in the context of heavy overhead production costs, which attribute continuous production, the long term productive possibility of estates point to the relative inelasticity of estate production to price changes.

Contractual and buyer controlled production processes also point to such an inelastic response. Labour employment also justify such rigidities since long-term contracts means possibly extensive and intensive sunk costs. The expense and trouble of disbandment and recruitment may make any change of programme or policy most costly and unjustifiable, so that, in line with notable Economic contention, the rule of profit

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(8) Rubber Statistics Handbook, 1960. Table 26. Statistics Department, K.L.

maximization, cost and loss minimization, will have to entail a rigid production programme, to make the production response to price comparatively inelastic.

ELASTICITY OF EXPORT SUPPLY

The crucial factor on the supply side which influence fluctuations in market price is the elasticity of export supply. Several components make up this elasticity. They are namely,

a) the price elasticity of production
b) the price elasticity of domestic consumption of rubber
c) the elasticity of inventory accumulation of the export good (rubber) in the producing country with respect to export prices, and
d) the elasticity of imports of the same good for re-export purposes.

Export supply may be more elastic than production reflecting changes in the rate of inventory accumulation. Variations in stocks of rubber held in a producing country may then contribute to a stabilizing or destabilizing aggregate situation. If more stocks are held when price is low and conversely when high prices prevail, then inventory changes will have a stabilizing effect.

Conversely if stocks are held when price is high and vice-versa in times of low prices, then this positive elasticity will further enhance changes in price.

Therefore, price speculations by stock owners, existent and potential buyers, may generate various degrees of stability or otherwise to the market sentimentality. Expectation's vary too.

INVENTORY BEHAVIOUR AT VARIOUS LEVELS

a) Estate Level

The physical limitations imposed as a check to inventory policy may offset the continuous production of estates since, storage capacity may be limited to a certain extent and since rubber is a highly inflammable material. Although insurance may offset the second factor, the expectations of price rises to premiums involved may mean that a larger margin of profit may be available to meet any increase in costs, comparably.

J. Wilson[9] for instance believes that there is a certain amount of speculation by estate managers in physical rubber, as they may decide to let stock accumulate in the hope of better pieces which will increase their estate profits and, therefore, their bonus.

In as much, it is appropriate to mention here that some estates do not follow any inventory policy beyond considerations of convenience of shipment. It is because of the volatile nature of rubber prices, that any unduly large accumulations of stock is thought unwise.

b) At Dealers' Level

As dealers in the Federation of Malaya hold approximately 70 percent of total inventions, their inventory policy is an important variable factor. The strength of such behaviour may be obscured by different locational distribution and different market "sentiments" of the people involved.

The level of production, price expectations and other forces may enhance the degree of speculation. Therefore, such expectations may differ depending upon the knowledge or ignorance of market conditions.

c) At Port Level

Stocks held at Federation ports are mostly rubber already sold and awaiting shipment. They account for some ten to eleven percent of total stocks of Malayan rubber.

d) At Re-export Level

Export elasticity may be influenced by the elasticity of rubber in ports for re-export purposes. The temporal spread of imports is, therefore, important in either enhancing or off-setting to a certain extent price fluctuations. In 1960, importations of rubber into Malaya accounted for 9.8 percent of gross rubber exports by volume.

The uncertainty of imports though smuggling operations (from Indonesia) is a further source of uncertainty in the Malayan rubber market.

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(9) J.Wilson "The Singapore Rubber Market", page 54.

e) Other Factors

The anticipated rate of exports, and price expectations in foreign exchange regulations or the rate of export duties, are all contributive factors which increase market uncertainty and price instability.

Dock strikes, trade disputes, temporary shortages in shipping or freight facilities or a diversion of trade routes because of political aspirations, would also have unsettling effects on price.

PRACTICAL CONSIDERATIONS

Factors which also govern the extent of supply of rubber within a certain period may be outlined as:-

1) The number of mature and immature acreages in operation.
2) The number of mature high yielding acreages in operation, and
3) The efficiency of production.

From the table given, Table 3-1, we can easily say how much of rubber will be produced in a certain year, but forecasts of production will only be estimates since one does not know or have assess to information regarding the age of the trees tapped, the acreages of mature and immature rubber and the changing yields of aging species. It should be noted carefully that any interpretation of yield records without appropriate qualifications would prove imsleading and incorrect. The table given, for instance, does not show yield of rubber from mixed stands and thus anyone looking at the given production schedule will have quite a distorted idea of the Malayan rubber production since no reference has been made to yield from mixed stands. But one would not be far from correct if a correlation analysis through the method of "least squares" is made to show a production trend for future years, if past yearly averages do not show too wide fluctuations. This shows us why forecasts are only made for short periods of time and not for substantially long periods.

From a generalised conclusion, we can ascertain from past records that high yielding material will give an approximate yearly average of 850 pounds to an acre. (This figure is, however, subject to wide deviations.)

Yields can be stimulated and increased, for instance, by varying the amount of fertilizer to plants, and recent records prove that with new stands like RRIM 623 and some latest RRIM 700 series, trees can produce a yearly output of

TABLE 3-1

ACREAGE TAPPED, PRODUCTION OF YIELD PER ACRE FOR HIGH-YIELDING MATERIAL AND UNSELECTED SEEDINGS 1954 to 1961.*

Year	PLANTED ACREAGE		HIGH YIELDING MATERIAL			UNSELECTED SEEDLINGS		
	Mature ('000 acres)	Immature ('000 acres)	Average Acreage Tapped	Production ('000 tons)	Yield Per Acre (lbs.)	Average Acreage Tapped	Production ('000 tons)	Yield Per Acre
1954	1,707	321	411	150	820	1,007	155	350
1955	1,685	339	446	160	806	1,012	160	355
1956	1,639	378	499	174	781	983	155	354
1957	1,601	420	555	200	806	927	155	374
1958	1,542	447	587	224	854	831	150	404
1959	1,469	481	620	249	898	772	150	434
1960	1,412	530	640	265	927	700	138	442
1961	1,383	563	683	294	965	626	126	449

SOURCE: Rubber Statistics Handbook 1961. Department of Statistics, Kuala Lumpur.

over 2,500 lbs. per annum per acre[10]. So, if such stands were introduced into the high yielding acreages, the generalised average yearly figure would be widely distorted.

Long period predictions, therefore, need substantial qualifications as well as modifications to give more appropriate estimates.

PRODUCTION EFFICIENCY

This is a very generalised heading which covers the efficiency of all factors involved in the production process. This means to say that tapping techniques and other associate tapping programmes, different uses of fertilizers and man-power, less wastage from coagulation, etc. also account for quite substantial quantities of total production. The importance of such a factor need hardly be emphasized since it is widely accepted that efficiency determines production quantum to a very great extent.

(10) M.A.S. "The Malayan Agriculturist" volume 2, 1961-1962. Page 50.