CHAPTER VII

PROBLEMS AND SOLUTIONS

A GENERAL PICTURE OF PRESENT COMPETITION

The threat of synthetics give rise to problems which need immediate attention. Although the theoretical aspects of competition between these two commodities have shown the relative balance of usage; nevertheless, the introduction of synthetic on the world market has shown that synthetic may become a better substitute than natural rubber can ever be. For example, synthetic materials like acrylonitrile co-polymers, Neoprene, Hypalon, Silicones and Butyl rubbers, give better service than natural rubber in certain applications which demand specific properties. These include impermeability to air and resistance to the adverse effects of contact with oil, exposure to the atmosphere and subjection to extremes of temperature. At the same time it is now generally accepted that the general purpose synthetic rubber SBR (formerly known as GRS) gives improved tyre wear in warm climates compared with the natural product - the tyre industry it should be noted is still the major consumer of rubber.

The danger of such a threat may be seen from Table 7-1 of rubber percentage used in the manufacture of tyre in 1959, by the main world consumers. If natural rubber should lose its foothold in such an industry, the industry's economy may be seriously impaired.

From the Table provided, it can be seen that the United States is the chief consumer, using abour 44.2 percent or 1,626,370 long tons of the total world output of rubber. (Here it must be noted that there is no reference to the Soviet Sectors consumption of world output of rubber. As it is, the Table cited by Loren G. Polhamus needs substantial qualifications before it can be generally accepted, However, im my analysis, in order to show the relative importance of natural and synthetic consumption in tyre and non-tyre products, as a basis for further analytical work, the table given may suffice to bring about a practical consideration of the general picture of competition between natural and synthetic). The emphasis in the use of synthetic in tyre making in the United States is indicated by a 41.2% use of synthetics as compared to a 21.8% use of natural rubber.

Recent records show that American rubber companies during the last five years, have successfully launched a pilot production plant for synthetic polyisoprene which has

TABLE 7-1.

CONSUMPTION OF RUBBER, 1959, IN TYRE AND NON-TYRE INDUSTRIES, IN CANADA, FRANCE, UNITED KINGDOM, and THE UNITED STATES.

	CANADA		FRANCE		UNITED KINGDOM		UNITED STATES	
Product	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Tyres.								
Natural	31,721	31.2	56,506	39.2	84,090	32.4	354,663	21.8
Synthetic	39,478	38.9	27,300	19.0	58,169	22.4	669,611	41.2
Total in %		70.1		58.2		54.8		63.0
Non-tyre. (Percentages used only)								
Natural		12.4		28.9		37.2		12.3
Synthetic		17.5		12.9		8.0		24.7
Total in %		29.9		41.8		45.2		37.0

SOURCE:
Loren G. Polhamus (1962) op.cit. page 376, Table XVIII.

an overall superiority to natural, as well as having technical properties approximate to those of the natural rubber product. Thus, Firestone announced their "Coral" rubber, Goodrich - gulf their "Ameripol SN", Goodyear their "Natsyn" and the United States Rubber-Shell corporation their "Cis-polyisoprene".

The Malayan Rubber Industry is thus confronted with a challenge amounting more to an economic threat. Although the costs of producing synthetics is commercially high, due to the existence of other synthetic plants, and high capital costs, factories are coming up because in some countries the Government is subsidizing the industry, and its product in some cases, dumped.

SOLUTIONS.

INTRODUCTION

It seems that the only preservative of the natural rubber industry from being seriously impaired would be a reduction in costs of production, an increase in yield per acre per annum, new usage of natural rubber, increase domestic consumption of natural rubber by encouraging new industries, and ultimately, should the Malayan economy want to be more stabilized a diversification of industry will have to take over the tin and rubber predominance.

Malaya cannot indefinitely depend on tin and rubber to preserve its economy. The impending danger is too obvious. Natural rubber has to meet its competitors in the world rubber market while tin is a robber economy which does not ascertain its indefinite extraction.

COSTS AS PRIME FACTOR IN FUTURE COMPETITION

There is already a recognition in the natural rubber industrial circles that future competition between natural and synthetic rubbers will be primarily on <u>cost</u>. The Natural Rubber News (1958) quoted H.T. Karsten, a director of the Limited Baltic Corporation and chairman and director of several other Malayan Companies who stated that:

> "So long as the price of natural rubber is above that of synthetic, there is an inducement to the manufacturers to sue synthetics".

Although I have made some hypothetical examples of cost calculations in the production of natural rubber, there is no <u>valid</u> over-all figure on the cost of raising natural rubber. Very efficient firms according to my calculations have operating costs within the range of 33 cts.

to 45 cts. per lb. (20). A director of the Anglo American Corporation was quoted in the early part of 1958 as believing that efficient estates have operating costs as low as 38cts. to 40 cts. per lb. of R.S.S. (1st quality ribbed smoked sheet). Although his figure is quite out of date, it still presents a very general idea of costs in very efficient estates. However, it must not be mistaken here that overall plantation costs are within such an approximation. Smaller and less efficient estates, may need high costs, and in still smaller acreages, the cost may be so great as to pronounce it commercially not feasible.

Here, it must again be understood that different kinds of wage payments are given to different people on different estate sizes. This may range from monthly and daily paid employees to the "bagi-dua" basis which is a kind of 50-50 sharing basis employed by very small farmers. It is because of such differences in wage payments, that costs of production tend to vary widely and as such, profit margins may vary too.

For the more efficient estates, therefore, prices of 60 cts. and over to the lb. may generate quite a satisfactory profit. Smaller and less efficient estates which have costs of 50 cts. to 60 cts. per lb. and will be first to feel the impact of losses should prices fall below 60 cts.

REPLANTING WITH HGIH YIELDING CLONES

Replanting with high yielding clones may contribute more than any other single factor to reduction in the cost of producing natural rubber. A tapper can handle as many high yielding as he can low-yielding trees. From this, it can be understood that labour productivity can be fully utilized with more economic high yielding clones. Economic efficiency may play a very important role in determining world dominance of usage and production. It is now possible for an individual tapper to produce double the output now being obtained, with relatively no increase in labour other than that involved in taking the additional weight of latex to the estate factory. This problem may be solved if the Malayan Rubber Industry adopt the Liberian "overhead trolleys" to bring in the additional latex. The planting cost and other features of estate management are not increased.

The estate factory costs are related directly to the amount of latex handled and would be increased in direct proportion to the increase in production. As has been already seen from experience and present tendency of labour union movements, the increased efficiency of high yielding estates will dndoubtedly be accompanied by increases in wages. The

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(20) Refer Chapter V.

question whether such wage demands are justifiable when no personal increases in efficiency are realised, has been constantly debated. Allowing for certain percentage increases in wages, the increased productivity of the individual worker when handling high-yielding trees could more than compensate for the increased labour costs.

It must be brought to light, however, that this sort of conclusion is an oversimplification of the problem. In planting as in any other forms of agriculture, there are a large number of uncontrollable variables which can upset or even reverse the application of my contention. To take the simplest case, it is a truism to say that under bad supervision, the best planting material is of little more use than the worst because high potential yields are only realised under efficient management. Such are problems whichmay need more attention than existing ones. The immediate solution, therefore, seems to be low cost, increased productivity and yield, and efficiency in all the factors of production.

LOWERING OF PRODUCTION COSTS

As automation is not possible in the tapping of rubber trees, the only solution to a lowering of costs of direct labour would be to increase the yield productivity of the trees. In a recent sampling done by the MPIEA. the rubber industry has an average increased yield of 496 lbs. in 1956 to a present increase output of 913 lb. an acre - an approximate increase of 84 percent. This increase is promising as an agent in the reduction of costs, but it should not be the end-all in productivity research, since the synthetic threat is too great.

If replanting with high yielding clones is done in the rubber industry, then costs can be reduced ₹ still further. Economic efficiency and productivity increment is, therefore, of prior importance in the pursuit of costs reduction in rubber planting.

Efficiency in management is essentially important since supervision is important in seeing to the efficiency of the other employees. It is only logical that inefficient supervision breeds inefficiency in the lower rungs of the production process. So unless the problem is dealt with from the top, the whole industry may still be producing inefficiently, in other words, producing rubber at much higher costs than commercially feasible. As had been emphasized earlier high potential yield of new clones will not be realisable unless supervisors are themselves efficient and not just economic parasites.

Efficiency is a measure of the overall factors

which are combined in the running of a plantation. It requires constant attention to detail and herein, lies the greatest danger. Costs are, as mentioned, the most important items in plantation management, and it is almost fatally easy to become immersed in costs to the exclusion of the main point of planting, that of growing and exploiting rubber trees in the most efficient way. Restricted expenditure is often used as a synonym for economy, whereas economy in this sense is often the converse of economic efficiency.

To be more specific, cheap methods of planting and maintaining immature trees and their reverse over cultivation and unbalanced manuring are not efficient. Money spent on efficient supervision is seldom wasted. The question of the degree of supervision to be provided is individual. Small amounts of money saved in trivial ways may lead to large expenditures or loss of large sums after the passage of years.

EXPANSION OF PRODUCTION FACILITIES TO MEET INCREASED CONSUMPTION.

The ability to expand sources of supply to meet increasing demand is a controlling factor in any major increase in consumption. Before the development of synthetic rubbers, expansion in the consumption of rubber was first dependent on intensified exploitation of wild sources of rubber - a relatively expensive operation - and, then, later on the relatively slow expansion of plantation production.

The very elastic demand for rubber and its relatively inelastic short run sources of supply, generally lead to high prices when demand is high and to a considerable time - lag in the reflection of high prices being pursued by increased production. Sustained demand has led to an enormous expansion of the rubber plantations during the first three decades of this century.

In the case of synthetic rubber, production is not rigid. Acceptable grades of synthetic rubber can be produced by standardised processes, increases in production can be realised as rapidly as the capital expenditures can be justified, authorised and translated into factories and facilities - a much shorter period than is required to transform a seed into a mature rubber producing tree. A single year of commercial and industrial development may equal half a decade of agricultural activities in the development of rubber producing facilities. This factor, more than any other, will determine the proportion of natural and synthetic rubbers used in the manufacture of commercial products in 1970 for instance.

This is another added advantage of synthetic over natural since there is an easier variability in production without a long wait. High natural rubber prices bring into

the market not only synthetic competition, but also "scrapped" rubber, which as records show, account for quite substantial annual amounts of rubber used in the manufature of tyre and non-tyre products. In fact reclaimed rubber was introduced long before the development of synthetic rubber. Americans regarded the use of such "reclaim" as a check to excessive rises in raw rubber prices.

According to forecasts (21) by distinguished rubber authorities the increase in consumption of rubber will be around five million tons a year by 1975. Malaya will be providing about 805,000 (22) metric tons by 1970. These forecasts provided are rather rough approximates and do not give the desired information as to how the figures are arrived at. The forecast can thus, be revised, since any forecasts must bring certain assumptions.

According to a very reliable local source, the Malayan rubber production forecast is based on rather conservative assumptions. It is, therefore, very likely that this estimated production will be reached while a higher production level seems possible. An estimate of the maximum production in 1970 for Malayan rubber would entail the following assumptions.

Assume that:-

1. Fragmentation and planting with other crops is blanced by new planting.
2. Replanting up to 1970 is reduced to an average of 20,000 acres per year. (Note that a reduction in replanting will result in a higher output in 1970).
3. Yield per acre of "old seedling" and "pre-war high yielding" remains at the 1962 level instead of slowly decreasing.
4. Average yield per acre of high yielding "post-war" material will have reached 1,200lb. in 1970.

Based on these assumptions (23), the statistics for 1970 would read as follows:

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(21) Source: Confidential.

(22) F.A.O. Commodity Review 1962: "Agricultural Commodities Projection by 1970", page II-87.

(23) These are figures for the estate side only.

	Acreage	Yield per acre
Old seedlings	400,000	440 lb.
Pre-war high yielding	230,000	1,025 lb.
Post-war high yielding	1,100,000	1,200 lb.
Immature	200,000	
Total acreage under rubber	1,930,000 acres.	

Therefore, total estimated estate production would be 770,000 tons.

Seemingly, if we assume that the smallholders production increases to a correspondingly 20 percent higher level, or 550,000 tons, then the total Malayan rubber output by 1970 would be in the vicinity of 1,3 million tons.

What is important here is that by 1970, we hope that all the rubber produced would be consumed. The F.A.O. commodity Review (1962) (24), gives a very optimistic view balancing the 1970 production estimates to the consumption estimates. We can, therefore, base our production policy on the figures given, and produce within the expected range of consumption.

EXPANSION OF PLANATIONS.

A multifold increase in synthetic rubber production in line with a continuing increase in the rate of rubber consumption does not appear nearly so difficult to attain as a doubling in natural rubber production.

The Rubber Statistical Bulletin of the International Rubber Study Group for February, 1958, estimates the total acreage of plantation rubber throughout the world as 11,210,000 acres.

In Malaya, according to the December, 1961, estimate made by the Statistics Department of Estate Acreage, there is still a rubber potential of 127,987 acres, which are capable of cultivation. If the price of rubber is high enough to offer a substantial margin of profits, then by 1975, if 100,000 acres were planted with high yielding clones, and if an average of 1,300 lbs. per acre per annum can be realised, a very substantial total output of rubber can be achieved.

International rubber statistics show that world production of natural rubber in 1957, is estimated at 1,892,500 long tons, or an average of only 378 lb. of rubber per acre per

(24) Op. cit. "Agricultural Commodities Projection , 1970" page II-89

per annum for the entire planted area. There is now a large acreage of clonal rubber with comparatively higher yield, but the predominant acreage of rubber trees consists of unselected seedlings with mean yields below that quoted as the "overall" average. The average Malayan unselected seedling yield for 1957 is 374 lbs. per acre and there were 972,000 acres of unselected seedlings tapped out of a total of 1,544,000 acres of mature rubber. However, the Malayan total of tappable acreage for unselected seedlings for 1961 dropped to 626,000 acres out of a tappable total of 1,337,000 acres. There are, of course, considerable acreages that have been replanted but have not come into full bearing. In Malaya alone, there were no less than 562,000 acres of immature untappable rubber in 1961. In addition even though there were 1,383,000 acres of mature rubber during that year, only 1,337,000 acres were tapped. The difference it has been determined arises from data which was not collected from the mixed stands acreage and other unrecorded productive acreages from estates overlooked in the compliation.

If rubber plantations are to continue on a sound healthy programme of expansion, all future estimates of production will need to make allowance for high proportions of immature trees and unrecorded data. The existing acreage may be expected to yield more rubber as the young trees come into full bearing. On the other hand, the increasing yield of maturing areas may be somewhat counterblanced by the decreased production of obsolescent plantings and areas taken out of production for replanting. Accordingly, it can be assumed that at any one time some 25% of the planted acreage will be out of tap because of immaturity or disseconomy in yield.

EXPANSION OF PRODUCTION FACILITIES FOR SYNTHETIC.

The expansion of facilities for the manufacture of synthetic rubber is going forward much more rapidly than the expansion of plantations. Announcements have been made of the construction, or plans for the construction of new factories for the production of synthetic in France, Great Britain, Holland, Italy, Northern Ireland, Scotland, Australia, West Germany as well as Russia. Technical journals also show the great advance in synthetic research as well as synthetic rubber production by all these countries. Each of the new factories will have an annual capacity of, from 5,000 tons to 60,000 tons of rubber. They include chiefly SBR types of rubber, and Butyl, Perbunan, Neoprene, and other specialty types.

In Russia it has been stated that synthetic rubber is now being produced in factories in 17 different places and that by 1960 the total capacity for producing synthetic rubber would have reached a level of 850,000 long tons per annum.

It is clear that the capacity of the world to produce synthetic rubber is being expanded rapidly, and this rate of expansion may be expected to continue as long as there is a prospect that consumption increases will continue at a rate comparable with those now being experienced.

New facilities now being developed are predominantly for those production of general purpose rubbers, for which there is a good assurance of continued demand for a sufficient period to amortise the cost of the facilities. Individual types of general purpose rubbers are subject to severse competition not only for from natural but also from new synthetic rubbers that are under experiemental test or that will be found in the future. The demand for the specialty rubbers is much more difficult to predict and the future competition among them may be even more intense.

RESEARCH FACILITIES

SCIENCE IN INDUSTRIAL DEVELOPMENT

The usage of rubber has doubled and redoubled during the first half of the century because of the economic and industrial progress of the world. Rubber has fitted into this economic expansion because of the speculative urge that has circulated throughout the world - to develop and increase the sources of natural rubber, to supply machinery and equipment for the manufacture of synthetic rubber and to utilize the natural and synthetic rubbers in the fabrication of articles adjusted to the advancing technology.

PROFIT MOTIVE

While the profit motive has been largely responsible for the phenomenal expansions, it alone, even though accompanied by the utmost in energy, could not have succeeded without the use of vast resources of scientific skill and concentrated research effort. The rubber industry, from plantation through to finished goods is a monument to the union of commercial, industrial, technical and scientific efforts. The future of the industry may well be determined by how well these skills are combined and utilized in the coming years. There is no saturation point in sight in the usage of rubber. Each new invention and advance in technology has increased rather than decreased the need for rubber. Limitations in the expansion of its usage can come only through the failure of technical and research effort to develop properties to meet each new demand, or of the rubber industry to increase sources of supply to meet the increased demand.

SCIENCE IN PLANTATION DEVELOPMENT.

Merely planting greater acreages of rubber trees, or

constructing more factories for the production of synthetic rubber, is not the answer to fulfilling increased demand in the future. Greater yields are possible from existing plantings through the improvement of tree response - by nutrients, bark stimulants and improved tapping sequences etc.. The majority of trees on existing plantations are un-selected seedlings with poor growth characteristics and inferior yields. Improved seedling and clonal selections are available for use in planting new areas or for replanting existing areas. This planting material is not universally acceptable and for best results, must be selected and proved for particular conditions. Variations in soil, rainfall, temperature and disease, control the selection of new clones or seed stocks. In Malaya, the Rubber Research Institute has successfully implemented the use of many new selected high-yielding clones. It is possible that the best of the present clones will be superseded by new clones with greater superior yield, better bark characteristics, and higher levels of resistance to the known diseases.

The only problem at present, seem to be the limitation in human populations capable of caring for rubber trees rather than the availability of land capable of nurturing rubber plantations. It has been popularly understood that high yielding trees without efficient supervision and management will be of little productive use, because, unless guidance and correct instructions are forthwith, high yielding rubber trees may be left uncared for, and uneconomically tapped. As has been stressed by many prominent Economists, the Tropics may be limited in human resources capable of utilizing efficiency and make the best use out of available resources. The element of entrepreneurship seem to be rather absent in the Tropical economies. Major increases in rubber production or plantations must come, to a greater degree, by increasing the output of the human elements through increased yields.

The character of the plantation product must be improved to keep pace with the carefully prepared laboratorial chemical rubbers. Extraneous impurities must be rigidly excluded and the character of the hydrocarbon itself improved or altered, in any suitable manner to meet new demands or improved characteristics of competing products.

PLANTATION RESEARCH.

From the "Natural Rubber News"(1958) the retiring chairman of the Rubber Producers' Council of Malaya, Mr. S.N. King * , stated on the present prospectus and status of the planta-

* The statement was made on 27th. Feb. 1958, in conjunction with a valuable summary of the present status of the plantation rubber industry, from a radio-press comment.

-tion rubber industry, that research is emphatical end of utmost importance in view of the aims of the synthetic industry to produce something like natural rubber. He is quite optimistic about this relationship and seems to show that since synthetic is pursuing after something similar to natural rubber, the research field for natural rubber would, therefore, be narrower.

This attitude is not unique and represents a general weakness of many leaders of the plantation industry who fail to understand the advances that have been made in rubber synthesis.

Mr. S.N. King's conclusion is not justified because, in general, research on synthetic rubber is directed not towards reproducing or stimulating natural rubber, but towards producing materials superior to natural rubber. While the versatality of natural rubber has not been matched, synthetic rubbers now have superior qualities in the way of oil resistance, resistance to oxidation and non-flammability, that may result in a permanent preference for synthetics in the future if more fundamental research is not put into improving the quality of natural rubber in those important characteristics. It must be emphasized here for purposes of reality that market grades of natural rubber are greatly inferior in purity and cleanliness to competing grades of synthetic rubber.

A great difficulty of efficient research is that immediate aims are emphasized to the exclusion of fundamental studies that are not directly related to current problems. This dim view may be offset by the potential factor that the future of the rubber plantation industry may depend, in large measure, on the degree to which producers of natural rubber are able to meet the threat of synthetic competition by production of new superior types of natural rubber.

It may be worthwhile to note that the future costs of production may depend on having and utilizing the fundamental knowledge of the physiology of the tree, including the chemical and physical processes involved within the latex system in the transformation of precursors into rubber; in the formation of the precursors of rubber and in the translocation of the precursors to the seat of rubber synthesis.

These answers are not to be obtained merely by studying the nutrition of the plant, or even through the detailed study of tapping methods. Fundamental studies are needed on the living processes within the plant, on how and why rubber is formed and on the physiological nature of the response to tapping and stimulation , and of resistance to disease. Such studies may not lead to immediate increases in yield or decreases in cost They may require years of costly research without significant

gain in plantation techniques.

In the natural rubber industry, the use of high yielding clones, improved cultural practises, yield stimulants and better tapping techniques, holds promise of increasing substantially yields per tree and per unit area. There is also a better understanding of the rubber tree from the agronomic and physiological points of view, and growing knowledge of its relationship to soils and water. From an economic point of view, however, it is desirable to analyse the long term production cost prospects largely in terms of several desirable factor costs inputs which are involved in producing rubber.

While there is no certainty that factor proportions will remain static, there are strong indications that direct labour factor inputs, as a proportion of total factor cost in producing natural rubber, will remain both high and fairly steady over time. The mechanization of natural rubber production is not even a serious topic of conversation, and labour inputs in most estate operations are not likely to drop below 50% of total factor costs based on present cost levels. On the basis of absolute physical relationships, the natural rubber industry usually produces between one and one-half tons per man year of estate labour. It is highly unlikely that this ratio will ever exceed two tons per man year of labour as long as each tree has to be individually tapped more than a hundred times a year.

This labour input component of total factor costs is important, as decreases in these costs, (since they will come largely at the expense of reduced labour earnings) are not too likely in most rubber producing areas of the world. Increasing labour efficiency is possible but limited in scope; at the same time it is probable that pressures on wages will absorb any such increases in labour efficiency in plantation production. Also relevant is the fact that any natural rubber producing nation which undergoes rapid industrialization or development will have additional pressures placed on the wage structure, and labour costs will tend to increase accordingly.

Perhaps the second most important factor input in producing natural rubber is administration. The large number of labourers, trees, latex cups, growth records, wage payments, welfare programmes, and other elements involved in a typical natural rubber plantation complex are a heavy and costly administrative burden. The prospects for lowering costs in this realm are difficult to assess but the likelihood is that they will be negligible over time. On smallholdings, of course, there is no line of demarcation between administration and labour, and they must be considered one.

A third important factor input is land. The Economist is essentially interested in land factor inputs per unit of output. It is within this field that the greatest cost reductions are likely in the long run. The development of high yielding clones and the fact that one eventually might be getting an average of 2,000 lbs. of rubber per year per acre whereas 400 to 500 was considered a good average in the past, is bound to push physical land input significantly lower. Land prices, considered on the basis of opportunity costs are likely to remain steady or, at least, not to increase appreciably in most major rubber producing areas. In some areas, including Malaya, rubber appears to be the only important economic use of land with the result that pressure on land prices as far as alternative uses of the land are concerned is almost non-existent.