# Rubber-Based Industrialisation in Kerala
## An Assessment of Missed Linkages

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*Kerala has a near monopoly in the production of natural rubber and yet it consumes only a small proportion of the produce. In fact, the state's NR-based industries are almost entirely confined to NR processing small-scale units with limited linkages.*

*This article attempts to examine the various linkages associated with the rubber plantation industry and assess its future scope.*

IN the industrial map of India, Kerala occupies a relatively insignificant position in terms of its share in national industrial output, total value added and total industrial employment. The slow pace of industrial development in Kerala is a much debated issue and various factors have been attributed to the prevailing industrial stagnation.[1] However, there is no disagreement on the main features of Kerala's industrial structure characterised by the dominance of traditional and resource-based industries and a relatively small share of the 'foot-loose' type of industries.[2] Among the industries based on the state's natural resources, natural rubber (NR)-based goods manufacturing sector occupies an important position in terms of its share in total value added in the census sector and a near monopoly position of the state in the production of the raw material.[3] But Kerala's share in total NR consumption in the country is only 12.22 per cent despite the fact that it accounts for about 90 per cent of the country's total NR production.[4] India's rubber goods manufacturing industry is concentrated in the states of Maharashtra, West Bengal, Uttar Pradesh, Punjab and Tamil Nadu whose combined share in total NR consumption is around 60 per cent. From the very beginning the growth of NR-based industries in Kerala has been confined to NR processing industries and small-scale units with limited linkage effects.

This paper is an attempt to examine various linkages associated with the rubber plantation industry and to assess how far Kerala has been able to reap the potential benefits related to its dominant position as the major source of raw material. The concluding part of the paper attempts to offer some tentative observations towards an explanation for the emerging trends.

### Structure of Industry

As of 1987-88, Kerala state had the largest number of rubber goods manufacturing units in the country. The two major characteristics of Kerala's rubber goods manufacturing industry are the agglomeration of small-scale units producing rubber bands, tread rubber, chappals and elastic rubber thread on the one hand and a very high degree of concentration in total NR consumption by three automotive tyre and tube manufacturing units accounting for around 71 per cent, on the other hand. Table 1 shows the size-wise pattern of NR consumption in Kerala and other major rubber goods manufacturing states.

Table 1 indicates that in Kerala three manufacturing units consuming more than 1000 MT of NR account for 70.74 per cent of the total NR consumption and in terms of concentration of consumption the state is next only to Uttar Pradesh. Interestingly, the average consumption of NR by the manufacturing units is the lowest in Kerala and is lower than the all-India average. One striking similarity between Kerala and all-India patterns of NR consumption is the dominance of large units. At this juncture, it is relevant to mention the pivotal position occupied by the automotive tyre and tube manufacturing units among the large units. For instance, during 1987-88 the 27 automotive tyre and tube manufacturing units in the country accounted for about 50 per cent of the total NR consumption and among them 12 large units' share was 45.59 per cent. Another important point to be noted is the significance of the tyre and tube manufacturing sector in the census sector of rubber goods manufacturing industry.[5] Table 2 illustrates the point.

The dominant position of the tyre and tube sector is obvious from Table 2. Our analysis is confined to the census sector mainly on account of its dominant share in the total value of output of the rubber goods manufacturing industry. In the industry, the tyre and tube sector assumes a greater importance since it acts as a springboard for the growth of ancillary industries as well as because of its employment potential. Table 3 shows Kerala's share in India's rubber-based industrial sector.

Table 3 is illustrative of Kerala's relatively stronger position in the unclassified group of industries which include NR processing industries also. We will examine the implications of such a situation in the succeeding sections of the paper which deal with an assessment of linkages of the rubber plantation industry.

### Linkages of Rubber Plantation Industry

The concept of linkages has been evolved from Hirschman's theory of unbalanced growth.[6] For analytical purpose, linkages are classified into three, viz, backward linkages, forward linkages and consumption linkages. The growth impulses set up by the establishment of an industry to its inputs supplying industries is termed as backward linkage effect. Contrary to this, if the establishment of an industry stimulates the opening of industries that use its output as inputs in their production, then forward linkage effects are said to be at work. Consumption linkages, also known as expenditure linkages, are emanating from the expenditure of income got from the marketed surplus.

For the present purpose, we will attempt to examine in detail the backward and the forward linkages of Kerala's rubber plantation industry based on the available information while the analysis of consumption linkages will be limited to a few observations owing to paucity of the relevant data.

In the standard literature on development economics, it is well-recognised that the linkage effects are relatively weaker in the case of primary products including plantation crops.[7] The export orientation of plantation agriculture gave rise to some forward linkages in the erstwhile colonies since many plantation crops technically require immediate processing after harvesting. Historically, Kerala was also developed as a raw material base for Britain by introducing plantation crops such as coffee, cardamom and then tea and rubber. Two important developments which have influenced the fortunes of Kerala's rubber plantation industry during the last five decades were the steady growth of Indian rubber goods manufacturing industry since the last 1930s and the changes in the ownership pattern favouring Indianisation since independence. These developments coupled with the active support from the government resulted in considerable expansion of the area under rubber and increased production of NR.[8] However, the steady expansion of area under rubber in Kerala[9] and the increased production of NR did not give rise to any substantial linkage effects in the region. In fact, very little of the industrial potential of NR was realised in the state.

The backward linkages of the rubber plantation industry are mainly confined to units supplying rubber planting materials, ar-

TABLE 1: CLASSIFICATION OF MANUFACTURING UNITS ACCORDING TO NR CONSUMPTION IN SELECTED STATES DURING 1987-1988

| States/NR Consumption | Below 10MT | | | Above 10MT and Below 50MT | | | Above 50MT and Below 100MT | | | Above 100MT and Below 500MT | | | Above 500MT and Below 1000MT | | | Above 1000MT | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | a | b | c | a | b | c | a | b | c | a | b | c | a | b | c | a | b | c | a | b | c |
| Kerala | 476 | 4.95 | 4.09 | 196 | 11.75 | 23.60 | 25 | 4.19 | 65.60 | 11 | 7.03 | 251.55 | 1 | 1.34 | 529.00 | 3 | 70.74 | 9275.67 | 712 | 100.00 | 55.25 |
| Maharashtra | 278 | 5.10 | 6.20 | 183 | 13.76 | 25.35 | 39 | 8.18 | 70.92 | 19 | 11.55 | 205.47 | 2 | 4.15 | 702.00 | 3 | 57.26 | 6448.00 | 524 | 100.00 | 65.47 |
| West Bengal | 277 | 3.81 | 5.18 | 117 | 8.23 | 26.48 | 30 | 5.84 | 72.93 | 26 | 13.69 | 198.15 | 6 | 12.71 | 797.17 | 4 | 55.72 | 5240.50 | 460 | 100.00 | 81.77 |
| Uttar Pradesh | 240 | 3.20 | 5.10 | 120 | 7.45 | 23.63 | 34 | 6.48 | 72.88 | 22 | 12.50 | 217.18 | 1 | 1.65 | 632.00 | 2 | 68.72 | 13126.00 | 419 | 100.00 | 91.17 |
| Punjab | 189 | 3.90 | 7.10 | 193 | 15.54 | 27.66 | 40 | 8.04 | 68.73 | 23 | 13.24 | 197.70 | 1 | 2.54 | 875.00 | 6 | 56.74 | 3247.33 | 452 | 100.00 | 75.96 |
| Tamil Nadu | 260 | 4.00 | 3.58 | 109 | 10.80 | 23.06 | 13 | 4.06 | 72.15 | 9 | 7.94 | 205.33 | 2 | 6.54 | 762.00 | 2 | 66.66 | 7557.00 | 395 | 100.00 | 58.91 |
| All India | 2521 | 4.69 | 5.35 | 1392 | 12.33 | 25.46 | 267 | 6.50 | 69.97 | 165 | 12.20 | 212.55 | 23 | 5.80 | 725.09 | 25 | 58.48 | 6725.28 | 4393 | 100.00 | 65.44 |

*Notes*: (a) = refers to total number of manufacturing units.
(b) = refers to percentage share of each group in total NR consumption for respective states.
(c) = refers to per capita NR consumption (in MT) by different groups in each state.

*Source*: Statistics and Planning Division, Rubber Board. Kottayam.

tificial fertilisers, fungicides and rainguarding materials. In Kerala, it is estimated that there are around 500 nurseries supplying rubber planting materials. However, in terms of linkage effect their role is rather weak. Table 4 summarises the estimated consumption and total value of other major estate inputs relevant to the industry.

Table 4 suggests that except in the case of rainguarding materials,[10] the state depends on imports for meeting the inputs requirements of the industry. In the case of artificial fertilisers it appears that the only unit in the state supplies not more than 50 per cent of the industry's requirements mainly due to the fertiliser policy of the government of India by which manufacturing units in different states are given quotas for different sectors and regions. Among the fungicides, 50 per cent of the total requirement of copper-oxichloride is met by a single large unit in the state and for the remaining 50 per cent the industry depends on two units located in Karnataka and Gujarat. The entire demand for copper sulphate is catered to by two units in the state while the industry is totally dependent on imports for emissan. In the case of rainguarding materials, more than 70 small-scale units in the state are meeting the requirements of the industry by processing the imported polythene granules.

The backward linkages of the industry appear to be relatively weak in terms of spread effects and creation of employment opportunities. It is also relevant to note that the consumption of estate inputs is more popular in the estate sector. A positive change in the cultural practices of the dominant small holdings sector may result in increased consumption of estate inputs. But the consequent expansion of production of the estate inputs consequent expansion of production of the estate inputs will not generate sufficient growth impulses owing to the weak linkage effect of the industries concerned.

## Forward Linkages

Among the various forward linkages of the industry, the NR processing industries occupy a prominent position in Kerala due to the geographical concentration of NR production and the peculiar characteristics of the raw material demanding immediate processing. The pattern of NR processing in India is characterised by the dominance of the conventional sheet grades accounting for around 68 per cent of the total production. The two major inputs for processing sheet rubber are rubber rollers and formic acid. It is estimated that there are 150 rubber roller manufacturing units in the state having employment opportunities for about 450 persons. However, for many of these units, roller manufacturing is only a part-time work and they are mainly engaged in welding and manufacturing of grills, windows, steel furniture, etc. The estimated consumption of formic acid by the sheet processing industry as on 1986-87 is around 640 MT valued at Rs 211 lakh. Two private sector factories in the state meet the entire demand of the industry.

The details of other major types of NR processing industries are summarised in Table 5.

From Table 5 it can be seen that about 92 per cent of the NR processing units producing crepe rubber, centrifuged latex and crumb rubber are located in Kerala providing direct employment to about 2,700 persons. The net value added in the three processing industries as a proportion of total value of output is comparatively insignificant suggesting lower forms of production where the potential for linkage effect will have well defined limitations. Except for the drier required for the crumb rubber processing factories and crepers for the crepe rubber processing factories, the state is dependent on external sources for the main items of machinery. In the case of centrifuging machine, the industry depends totally on imports from Sweden, China and West Germany.

Another important source of forward linkage of the industry is the primary marketing of NR which is characterised by a three-tier system.[11] As on 1987-88, there were about 5,808 rubber dealers in the country and of whom 5,080 were operating in Kerala including 37 co-operative rubber marketing societies. But the only important contribution of this sector in terms of economic activity is the employment opportunities for more than 8,000 persons including the transportation of NR.

In short, the concentration of NR processing industries and primary marketing has not resulted in any substantial forward or backward linkages. As mentioned earlier, it is the rubber goods manufacturing sector, especially, the automotive tyre and tube sector which assumes importance in terms of total value of output, employment and linkages.[12]

## Automotive Tyres and Tubes

During 1987-88, among the 27 automotive tyre and tube manufacturing units, 12 large units accounted for more than 92 per cent of total NR consumption in this sector and the remaining 15 were either manufacturing only two- and three-wheeler tyres or new units as yet at the initial stages of production.[13] Therefore, for the present analytical purpose, we are mainly concerned with the

Table 2: Composition of Rubber Goods Industry (Census Sector) in Kerala and All India, 1982-83

| Industry Groups | Percentage Share in Capital Invested | | Percentage Share in Total Value of Output | | Percentage Share in Net Value Added | | Percentage Share in Employment | |
|---|---|---|---|---|---|---|---|---|
| | Kerala | All India | Kerala | All India | Kerala | All India | Kerala | All India |
| Tyre and tube | 78 | 86 | 55 | 82 | 75 | 80 | 43 | 61 |
| Footwear | 3 | 2 | 4 | 3 | 1 | 3 | 10 | 6 |
| Others | 19 | 12 | 41 | 15 | 24 | 17 | 47 | 33 |

*Source*: *Annual Survey of Industries (Census Sector) 1982-83*, Central Statistical Organisation, Government of India.

Table 3: Kerala's Share in India's Rubber Industry (Census Sector), 1982-83

| Industry Groups | Percentage Share in Capital Invested | Percentage Share in Total Value of Output | Percentage Share in Net Value Added | Percentage Share in Employment |
|---|---|---|---|---|
| Tyre and tube | 8.1 | 8.0 | 14.3 | 6.7 |
| Footwear | 14.2 | 16.4 | 2.6 | 14.4 |
| Others | 13.8 | 31.1 | 21.7 | 13.7 |
| Total | 8.96 | 11.82 | 15.20 | 9.47 |

*Source*: Same as Table 2.

Table 4: Estimated Consumption of Major Estate Inputs by Rubber Plantation Industry, 1987-88

| Input | Estimated Consumption (in MT) | Estimated Total Value (Rs Lakh) | Estimated Share of Kerala-Based Input Manufacturing Units in Total Consumption (Per Cent) |
|---|---|---|---|
| Artificial fertilisers (x1) | 51,000 | 1,147.50 | NA |
| Fungicides (x2) | 1,000 | 380.00 | 75 |
| Rainguarding materials | 500 | 200.00 | 100 |

*Notes*: (x1)—The major artificial fertilisers used by the industry are urea, phosphate, potash and magnesium sulphate.
(x2)—Important among the fungicides are copper-oxichloride, copper sulphate and emissan.

*Source*: Estimates are based on the details available with the Rubber Board.

large units in the industry. Table 6 shows Kerala's relative shares in the total installed capacity, output and employment compared to other states.

Table 6 shows that except in the case of employment Kerala's other relative shares are below all other selected states. The higher rates of capacity untilisation in the states of Maharashtra and Tamil Nadu also deserve mention here.

Though the shares of the remaining 15 units in NR consumption and actual production are insignificant, their locational concentration is noteworthy. Among the 15, five are located in Maharashtra, three in Uttar Pradesh, two in Punjab and only one unit in Kerala which was promoted in the joint sector. The emerging trends in locational concentration in installed capacity, actual output and NR consumption have serious implications mainly in regard to the growth of allied industries catering to the requirements of the tyre and tube industry. For instance, the automotive tyre and tube industry requires various petro-based inputs other than NR for the manufacture of a tyre. Table 7 gives cost-wise shares of the major inputs in the total material cost of a tyre.

Table 7 shows that more than 60 per cent material input costs in tyre manufacturing are accounted for by the petro-based inputs and the relative share of NR is only 26 per cent. Table 8 shows the location, production and total value of the major inputs other than NR used in the manufacture of a tyre.

From Table 8, it can be seen that the major inputs for the industry valuing more than Rs 700 crore are manufactured outside the state. Location-wise and production-wise these inputs manufacturing industries are concentrated in the states of Maharashtra, West Bengal and Tamil Nadu. Many of these industries are characterised by lower levels of capacity utilisation resulting in shortage and a substantial difference between domestic and international prices.[14] Among the two inputs mainly used in the non-tyre sector, viz, reclaimed rubber and titanium dioxide, Kerala has a monopoly in the production of the latter.[15] Another important input used in the tyre and tube sector is butyl rubber for which the country is totally dependent on imports.

Tyre machinery manufacturing units form another strong source of backward linkage of the industry. At present, it is estimated that about 90 per cent of the machinery required for the tyre and non-tyre sectors are produced by nine leading manufacturers in the country. Among the nine, four are located in Maharashtra, two in West Bengal and Kerala's share is nil. Therefore, it is plausible to conclude that not only Kerala's share in the dominant tyre and tube manufacturing industry is comparatively insignificant but also various sources of backward linkages of the industry are virtually absent in the state.

Even though the by-products of the rubber plantations are not directly related to NR production, they form another important source of forward linkage of the industry by virtue of their industrial uses and commercial importance. The three important by-products of the industry are rubber wood, rubber seed and rubber honey.

(a) *Rubber wood*

According to a recent estimate of the Rubber Board, the annual production of rubber wood is around 40 million cubic feet valuing more than Rs 40 crore. About 60 per cent of the total rubber wood produced is stem wood and the remaining 40 per cent is branch wood. The major industrial uses of stem wood are summarised in Table 9.

It is estimated that there are around 500 small-scale rubber wood consuming units in the state. However, the net value added in the major rubber wood consuming industries in the state are negligible compared to the pattern of rubber wood utilisation and the resultant value added in Malaysia. Malaysia is successful in using rubber wood after chemical treatment for making furniture and various other applications of traditional hard wood varieties. Therefore, in Kerala, there exists a vast potential for rubber wood in many applications where the scarce hard wood varieties are presently used.

TABLE 6: SHARES OF SELECTED STATES IN INSTALLED CAPACITY, ACTUAL PRODUCTION AND EMPLOYMENT IN AUTOMOTIVE TYRE AND TUBE SECTOR (1985-86)

| State | Percentage Share in Installed Capacity | Percentage Share in Actual Production | Percentage Share in Employment* |
|---|---|---|---|
| Maharashtra | 21.94 | 27.60 | 15.92 |
| West Bengal | 16.62 | 14.08 | 27.70 |
| Tamil Nadu | 15.44 | 17.01 | 14.64 |
| Karnataka | 12.35 | 8.90 | 6.36 |
| Kerala | 10.29 | 5.78 | 11.46 |
| Sub-total | 76.64 | 73.37 | 76.08 |
| Others | 23.36 | 26.63 | 23.92 |
| Total | 100.00 | 100.00 | 100.00 |

* The data relating to employment are for year 1987.

*Sources*: Compiled from: (1) Tyre and Tube Industry, DGTD, Government of India, 1987, (2) Annual Reports of ATMA and (3) *Rubber and Plastics News*, October 17, 1988.

TABLE 7: COST-WISE SHARE OF MAJOR INPUTS USED IN TYRE MANUFACTURING

| Inputs | Share in (Per Cent)* |
|---|---|
| Nylon/Rayon tyre cord | 30 |
| Natural rubber | 26 |
| Carbon black | 13 |
| Styrene butadiene rubber (SBR) | 7 |
| Chemicals | 7 |
| Butyl rubber | 6 |
| Polybutadiene rubber | 4 |
| Processed oils | 2 |
| Other items | 5 |
| Total | 100 |

* The cost-wise shares of major inputs listed above represent tyre manufacturing mainly in Indian conditions.

*Source*: *Tyre and Tube Industry*, DGTD, Government of India, 1987, p 23.

TABLE 5: DETAILS OF MAJOR FORMS OF NR PROCESSING INDUSTRIES OTHER THAN SHEET RUBBER IN KERALA, 1987-88

| Industry | Total No of Processing Units in India (Nos) | Total No of Processing Units in Kerala (Nos) | Total Employment (Nos) | Estimated Total Value of Output (Rs in Lakh) | Estimated Net Value Added (Rs in Lakh) | Major Items of Machinery | Total No of Machinery Manufacturing Units in Kerala (Nos) | Estimated Share of Kerala's Machinery Manufacturing Units in Total Requirement (Per Cent) |
|---|---|---|---|---|---|---|---|---|
| Crepe rubber | 106 | 102 | 1500 | 5025 | 395.30 | Crepers | 5 | 900 |
| Centrifuged latex | 33 | 27 | 570 | 7068 | 2776.95 | Centrifuging machine | Nil | Nil |
| Crumb rubber | 16 | 15 | 730 | 1402.50 | 227.30 | Crepers | 3 | 50 |
| | | | | | | Hammer mill | Nil | Nil |
| | | | | | | Hydraulic press | Nil | Nil |
| | | | | | | Drier | 4 | 100 |

*Source*: Estimates based on the details available with the Rubber Board.

(b) *Rubber seed*

The two main products processed from rubber seed are rubber seed oil and seed cake.[16] The processed rubber seed contains about 70 per cent seed cake and the remaining 30 per cent is seed oil. The present commercial production of seed cake is estimated to be more than 7,000 MT valuing about Rs 2.45 crore. It is very rich in protein and energy and is at present mixed with cattle and poultry feeds. Rubber seed oil is mainly consumed by the soap manufacturing industry and also used in the production of paints as a substitute for linseed oil. Rubber seed oil mixed with sulphur could be used as a factice which is very often used as a rubber compounding ingredient. Finally, epoxidised rubber seed oil could be used for the manufacture of anti-corrosive coatings, adhesives and alkyd resin coatings. The present annual production of rubber seed oil is estimated to be around 4,000 MT valued at Rs 6 crore.[17]

Interestingly, more than 90 per cent of the rubber seeds is processed in Tamil Nadu for two reasons. First of all, in Kerala the rubber seed bearing season is during July-September period when the weather conditions in the state are not favourable for immediate sun-drying. However, during the same period Tamil Nadu has relatively favourable weather conditions for sun-drying coupled with large idle capacity in the groundnut oil processing industry to be utilised for rubber seed oil processing.[18] As a result of these peculiar circumstances, the state is losing at least Rs 5 crore as value added in the rubber seed processing sector.

(c) *Rubber Honey*

It is estimated that at least 40 per cent of total production of honey in India is originated from rubber plantations.[19] In 1986-87, about 2,750 MT of honey was produced from rubber plantations valued around Rs 5 crore. Unfortunately, among the 35 large-scale rubber-based honey processing units only 10 are located in Kerala whereas Tamil Nadu has 25 units. To a large extent, it shows the untapped potential for rubber-based honey processing units in the state.

The discussion on the forward linkages related to the by-products of the industry suggests that though Kerala has concentration in both rubber wood production and consumption, the net value added in the consuming industries is negligible compared to the existing potential. In the case of both rubber seed and honey the state could not utilise the existing potential owing to various factors ranging from weather conditions and lack of government intervention.

Assessment of consumption linkages suffers from paucity of data pertaining to the expenditure of surplus generated in the industry. Hence, we are confining our discussion to certain general observations.

Compared to the major cash crops grown in the state, NR is one of the few crops assured of a steady and remunerative price.[20] To a considerable extent, the surplus generated was utilised for expanding NR cultivation in the traditional and non-traditional areas in the state. During the period between 1949-50 and 1985-86, area under rubber in the Malabar region has grown to the extent of 831 per cent compared to 344 per cent in Travancore-Cochin. In Kottayam and Idukki districts tea was replaced by rubber.[21] The expansion of area under rubber was later extended to the neighbouring states of Tamil Nadu and Karnataka also by the planters of Kerala.

There are also evidences to suggest that the growth of socio-economic institutions such as schools, hospitals, banks and roads in the remote rubber growing areas of the state is closely related to the fortunes of the planting community. Though this observation requires data, it offers scope for a detailed enquiry into the pattern of expenditure from the surplus generated.

## Contributing Factors and Policy Options

Our discussion on rubber-based industrialisation in Kerala and its various dimensions shows that its vast NR production base could not act as a springboard for attaining a leading position in the rubber goods manufacturing sector of the country. In a sense, Kerala's situation with regard to NR-based industries represents the classic case of 'centre' and 'periphery' since the state can boast of only NR processing industries characterised by a comparatively low level of net value added and weaker inter-industry linkages. The stagnation of rubber goods manufacturing industry in Kerala and the concentration of growth of the same in Maharashtra, West Bengal and Tamil Nadu demands a detailed enquiry. For the present purpose, we are limiting our analysis to certain region-specific factors affecting Kerala in the context of the development of rubber goods manufacturing industry in India.

In this context, it is important to note that under British colonial rule, the industrial development of the country was confined to three port-cum-nodal points, viz, Calcutta, Bombay and Madras. Industrial growth did not spread from these port-enclaves and the pattern of concentrated growth which emerged in the islands had little impact on the vast hinterlands of the country. For instance, as late as in 1948, the three regions together accounted for about 77 per cent of total value of industrial production in the country.[22] As pointed out by Krishna Bharadwaj, even during the post-independence period, the pattern of agglomerated growth based on generally capital intensive large-scale manufacturing

Table 9: Major Industrial Uses of Stem Wood, 1986-87

| Line of Manufacturing | Percentage Share in Total Stem Wood Consumption |
|---|---|
| Packing cases | 27.70 |
| Veneers only | 8.70 |
| Veneers and splints | 24.66 |
| Splints only | 13.10 |
| Tea chest panels and plywoods | 13.21 |
| Seat and back for chairs | 4.77 |
| General plywoods | 7.86 |
| Total | 100.00 |

*Source*: Compiled from Viju Ipe C et al, 'Rubber Wood Consuming Units in Kerala: Technical Facilities and Problems', *Rubber Board Bulletin*, No 1, July-September 1987, p 22.

Table 10: Share of Selected States in Total Value of Output of Rubber Goods Manufacturing Industry in India, 1982-83 (Census Sector)

| States | Share (in Percentage) |
|---|---|
| Maharashtra | 20.32 |
| Tamil Nadu | 16.00 |
| Uttar Pradesh | 12.72 |
| West Bengal | 12.65 |
| Sub-total | 61.69 |
| Others | 38.31 |
| Total | 100.00 |

*Source*: Same as Table 2.

Table 8: Location, Production and Estimated Value of the Major Inputs Other Than NR in Tyre Manufacturing

| Inputs | Year | Total No of Units in the Country | No of Units in Kerala | Total Production (in MT) | Estimated Total Value (Rs in Lakh) |
|---|---|---|---|---|---|
| Nylon tyre yarn | 1986 | 6 | Nil | 23731 | 23731 |
| Rayon tyre yarn | 1986 | 3 | Nil | 5391 | NA |
| Carbon black | 1986 | 7 | 1 | 94367 | 17929 |
| Synthetic rubbers | 1986 | 2 | Nil | 34836 | 8010 |
| Rubber chemicals | 1986 | 4 | Nil | 14196 | 1225 |
| Zinc oxide | 1984 | 5 | Nil | 4472 | 932 |
| Fatty acids | 1984 | 15 | Nil | 53198 | 14895 |
| Reclaimed rubber | 1986 | 21 | 1 | 37415 | 2057 |
| Titanium dioxide | 1984 | 2 | 2 | 11151 | 2209.5 |

*Sources*: (1) Hand Book of Rubber Statistics, All India Rubber Industries Association, Bombay, 1987.
(2) Tyre and Tube Industry, DGTD, Government of India, 1987.

was mainly concentrated in Calcutta conurbation, Madras conurbation, Bombay-Gujarat conurbation, Delhi metropolitan region, Jamshedpur-Dhanbad-Bokaro complex and Ludhiana-Jullunder complex due to region specific factors and public investment. Interestingly, the pattern of growth of NR-based industries also broadly confined to the traditional regions of industrial growth in the country. Table 10 illustrates the point.

Table 10 shows that the combined share of Maharashtra, Tamil Nadu and West Bengal is around 48.97 per cent. The development of NR-based industries in Uttar Pradesh since 1960s is characterised by the growth of units manufacturing automotive tyre and tube, latex-based adhesives, sports goods, rubber-covered rollers, etc. Kerala occupies the fifth rank with a share of 11.82 per cent.

Since 1930s the growth of NR-based industries in India was in tune with the general pattern of industrial growth characterised by a high degree of regional concentration. For instance, the first two automotive tyre factories in the country were established in West Bengal (1936) and Maharashtra (1942) while it was only in 1960 that such a unit was established in Kerala. To understand the region's cost advantage/disadvantage in relation to the all-India pattern, a comparison of the major components of total value of output for the tyre and tube sector is attempted in Table 11. The choice of census sector is guided by the consideration of capturing the average behaviour of less-heterogeneous units in terms of size characteristics. To avoid abnormalities, we are examining the average of the latest three-year period for which ASI data are available.

Table 11 indicates that Kerala had the third lowest position in material costs, second lowest in fuel costs and rent compared to other six states during the three-year period. But the share of interest is the highest in the state. Profit expressed as a proportion of total value of output is the second lowest in the state and it is lower than the all India average. However, during the year 1982-83 Kerala had the lowest material cost and the highest profitability though with the second highest share of interest.

Among the major components of total value of output in Kerala, one striking aspect is a comparatively higher share of interest. One possible explanation is that the tyre and tube manufacturing units in the state could not avail adequate financial assistance from national or state level soft loan lending agencies. It is also possible that the accumulated interest arrears of the units might have reflected in the final picture since till recently

TABLE 13: BASIC INDICATORS OF PRODUCTIVE EFFICIENCY—TYRE AND TUBE SECTOR-- CENSUS SECTOR, THREE-YEAR AVERAGE

*(Rs in lakh)*

| States/ Indicators | Fixed Capital / Net Value Added | Net Value Added / Labour | Net Value Added / Output | Fixed Capital / Labour | Emoluments / Labour |
|---|---|---|---|---|---|
| Kerala | 1.91 | 0.55 | 0.21 | 1.06 | 0.18 |
| West Bengal | 0.89 | 0.33 | 0.18 | 0.29 | 0.19 |
| Tamil Nadu | 1.34 | 0.22 | 0.08 | 0.29 | 0.17 |
| Karnataka | 8.84 | 0.22 | 0.09 | 1.93 | 0.12 |
| Maharashtra | 0.54 | 0.49 | 0.17 | 0.27 | 0.27 |
| Punjab | 0.65 | 0.15 | 0.12 | 0.10 | 0.07 |
| Uttar Pradesh | 1.83 | 0.42 | 0.13 | 0.77 | 0.18 |
| All India | 1.31 | 0.41 | 0.16 | 0.54 | 0.18 |

*Source*: Same as Table 2 and data for respective years.

TABLE 11: SHARE OF MAJOR COMPONENTS OF TOTAL VALUE OF OUTPUT IN TYRE AND TUBE INDUSTRY (CENSUS SECTOR)
Shares as Per Cent of Total Value of Output

| State/ Components | Materials 3-Year Average* | Fuels 3-Year Average | Emoluments 3-Year Average | Additional Emoluments 3-Year Average | Rent 3-Year Average | Interest 3-Year Average | Depreciation 3-Year Average | Other Inputs 3-Year Average | Profit 3-Year Average |
|---|---|---|---|---|---|---|---|---|---|
| Kerala | 68.49 (3) | 3.74 (2) | 5.79 (5) | 1.18 (5) | 0.08 (2) | 11.74 (7) | 5.50 (6) | 1.77 (1) | 1.71 (6) |
| West Bengal | 66.80 (1) | 5.46 (5) | 8.93 (7) | 1.56 (7) | 0.05 (1) | 3.95 (5) | 1.79 (4) | 7.55 (7) | 3.91 (5) |
| Tamil Nadu | 75.30 (6) | 6.42 (7) | 5.56 (4) | 1.17 (4) | 0.11 (3) | 1.43 (1) | 1.44 (3) | 4.38 (3) | 4.19 (4) |
| Karnataka | 68.27 (2) | 4.00 (3) | 3.98 (1) | 0.87 (3) | 0.23 (5) | 9.91 (6) | 8.24 (7) | 7.36 (6) | −2.86 (7) |
| Maharashtra | 72.10 (4) | 5.01 (4) | 7.70 (6) | 1.37 (6) | 0.20 (4) | 2.78 (3) | 1.35 (2) | 4.75 (4) | 4.74 (2) |
| Uttar Pradesh | 73.08 (5) | 3.55 (1) | 4.94 (3) | 0.61 (2) | 0.38 (6) | 2.80 (4) | 4.20 (5) | 6.03 (5) | 4.32 (3) |
| Punjab | 78.21 (7) | 6.12 (6) | 4.93 (2) | 0.42 (1) | 0.11 (3) | 1.68 (2) | 0.92 (1) | 2.64 (2) | 4.97 (1) |
| All India | 69.29 | 4.74 | 5.91 | 1.02 | 0.19 | 3.83 | 2.70 | 9.86 | 2.46 |

* The three-year period refers to 1980-81, 1981-82 and 1982-83.
Figures in brackets indicate respective ranking of different components for the three-year period.
*Source*: Same as Table 2 and data for respective years.

TABLE 12: SHARE OF MAJOR COMPONENTS OF TOTAL VALUE OF OUTPUT IN OTHER RUBBER PRODUCTS GROUP (CENSUS SECTOR)
Shares as Per Cent of Total Value of Output—Three-Year Average

| States/ | Materials | Fuels | Other Inputs | Emoluments | Additional Emoluments | Rent | Interest | Depreciation | Profit |
|---|---|---|---|---|---|---|---|---|---|
| Kerala (31.1) | 78.9 | 2.5 | 2.9 | 4.3 | 0.6 | 0.1 | 1.6 | 0.7 | 8.4 |
| Tamil Nadu (22.4) | 50.3 | 4.2 | 16.5 | 13.8 | 1.8 | 0.5 | 2.8 | 2.3 | 7.8 |
| Maharashtra (12.9) | 47.0 | 5.6 | 18.2 | 16.7 | 3.0 | 0.3 | 6.1 | 2.8 | 0.3 |
| West Bengal (9.7) | 66.3 | 4.6 | 10.5 | 19.3 | 3.0 | 0.3 | 5.4 | 1.4 | −10.8 |
| Uttar Pradesh (2.7) | 52.6 | 9.1 | 7.7 | 6.1 | 0.5 | 0.3 | 3.8 | 4.0 | 15.9 |
| Punjab (1.0) | 71.4 | 6.2 | 5.5 | 8.4 | 1.1 | 0.1 | 2.8 | 3.4 | 1.1 |
| Sub-total (79.8) | | | | | | | | | |
| All India (100.0) | 62.1 | 4.4 | 11.3 | 10.8 | 1.6 | 0.3 | 3.5 | 2.0 | 4.0 |

Figures in brackets represent percentage shares of selected states in total value of output of the other Rubber Products Group in the Census Sector for the year 1982-83.
*Source*: Same as Table 2 and data for respective years.

the operational results of at least two units in the state were not encouraging.

Kerala's share in total value of output of the other rubber products (except footwear) in the census sector was the highest in 1982-83 amounting to 31.10 per cent. The shares of the major components of total value of output of this group in the state represents a completely different picture. Table 12 summarises the details.

Relative shares of the components of total value of output of other rubber products group in Kerala are lower than the national average except in the cases of materials and profit. In Kerala, this industry group mainly include NR processing industries and latex-based rubber goods manufacturing units. Therefore, it is quite natural that the share of material inputs will be relatively larger reflecting a higher NR content. Inter-year fluctuations in the share of profit are less suggesting a comparatively steady performance of this group. Moreover, when profit is represented as a percentage of total invested capital, Kerala tops the list in this industry group throughout the three-year period under consideration.

The analysis of the shares of major components of total value of output is inadequate to explain the productive efficiency of NR-based industries in Kerala *vis-a-vis* all-India pattern and other major states. Therefore, certain basic structural ratios and technical coefficients are examined. Table 13 shows the basic indicators of productive efficiency in the automotive tyre and tube manufacturing sector.

Table 13 indicates that Kerala's automotive tyre and tube manufacturing industry is characterised by the syndrome of relatively poor capital-productivity and higher capital-intensity as is evident from the second highest capital-output ratio and capital-labour ratio. However, during the year 1982-83 there was a marked improvement in capital-output ratio and Kerala fared better than other states except Maharashtra and Tamil Nadu. Labour productivity was the highest in Kerala during the three-year period and in 1982-83 there was a quantum jump. But the earnings per labour is not in tune with the labour productivity indicating a situation of higher labour productivity and comparatively lower level of wages. The net value added per unit of output is the highest in Kerala during the three-year period as well as in 1982-83.

To sum up, the analysis of the major components of the total value of output as well as the basic structural ratios and technical coefficients suggests that location-wise Kerala is not in a disadvantageous position with regard to automotive tyre and tube manufacturing industry. The basic data on the total value of output and capital stock of the industry for the three years clearly show that in Kerala the value of output has increased to the extent of 131 per cent between 1980-81 and 1982-83 without any substantial changes in the total value of capital stock. Alternatively, it becomes evident that if the capacity utilisation in the industry can be maintained at economic levels, automotive tyre and tube manufacturing in Kerala is as profitable as elsewhere in India.

Kerala's position with regard to other rubber products reflects a comparatively positive and consistent picture. Table 14 shows the basic indicators of productive efficiency for other rubber products group (excluding footwear).

As is evident from Table 14, Kerala had the lowest capital-output ratio reflecting a higher capital-productivity compared to other states and the all-India average in the other rubber products group. Its labour-productivity is also one of the highest but earnings per labour and capital-intensity are lower compared to all-India average. The ratio of net value added to total value of output is one of the lowest in the state indicating the dominance of industries with higher share of raw material costs in the total value of output. A higher capital productivity and labour productivity coupled with relatively lower earnings per worker suggests the possibilities of higher rates of profit in this industry group. One important characteristic of this industry group is that during the three-year period inter-year changes in the values of the relevant ratios were relatively lesser in the case of Kerala.

One of the important conclusions emerging from our analysis is that a near monopoly position in the production of NR did not help Kerala to achieve a desirable level of development in rubber-based industries. Backward linkages of the rubber plantation industry are weak and a careful scrutiny of forward linkages of the industry clearly shows that in Kerala they are mainly confined to the NR processing industries with limited linkage effects. Relative shares in installed capacity, employment and total value of production in the dominant automotive tyre and tube manufacturing industry and its allied industries are negligible.

An analysis of the major components of total value of output and basic indicators of productive efficiency of the tyre and tube industry in Kerala compared to other selected states shows that locationally Kerala is not in a disadvantageous position and uneconomic levels of capacity utilisation is identified as the main problem. Therefore, the potential for establishing units manufacturing tyre and tube as well as selected inputs is worth exploring.

Kerala's performance in the case of other rubber products group appears to be better than the selected states and all-India average. There are also evidences to point out that the state had better results in those industries and products where the NR content is relatively higher. Incidentally, for export of rubber goods, government of India is encouraging rubber products with high NR content by offering an NR subsidy to offset the differences between international and domestic NR prices. India is also importing a variety of rubber products and during 1986-87, the total value of imports was Rs 63.68 crore. To take advantage of the changing requirements of internal and export markets needs a careful study to identify specific products with market potential. It may call for product diversification which requires meticulous co-ordination.

Among the three by-products of the rubber plantation industry, rubber wood has the largest industrial potential. Shortage of traditional hard wood varieties and their steadily increasing prices are two serious problems for consideration. Malaysia's sustained efforts in converting rubber wood comparable to hard wood varieties after chemical treatment proved to be successful and today rubber wood-based furniture and other wood products are well accepted in the world market. Hence, modernisation and expansion of rubber wood processing facilities in the state assume great importance. The potential of rubber honey is also very promising. Popularisation of bee-keeping in the rubber growing areas and establishment of central honey processing units are also expected to yield the desired results.

In conclusion, it becomes necessary to point out that exploitation of NR-based industrial potential in Kerala needs identification of industries and products having locational advantage and a comparatively higher linkage effects. Ironically, after more than 30 years of the formation of the state, no attempt has been made so far to establish

TABLE 14: BASIC INDICATORS OF PRODUCTIVE EFFICIENCY—OTHER RUBBER PRODUCTS GROUP—CENSUS SECTOR, THREE-YEAR AVERAGE

*(Rs in lakh)*

| States/ Indicators | Fixed Capital | Net Value Added | Net Value Added | Fixed Capital | Emoluments |
|---|---|---|---|---|---|
| | Net Value Added | Labour | Output | Labour | Labour |
| Kerala | 0.34 | 0.32 | 0.15 | 0.11 | 0.10 |
| West Bengal | 0.64 | 0.08 | 0.17 | 0.05 | 0.10 |
| Tamil Nadu | 0.46 | 0.35 | 0.31 | 0.16 | 0.18 |
| Maharashtra | 0.63 | 0.14 | 0.26 | 0.09 | 0.11 |
| Punjab | 1.19 | 0.11 | 0.15 | 0.13 | 0.08 |
| Uttar Pradesh | 0.82 | 0.29 | 0.26 | 0.24 | 0.07 |
| All India | 0.61 | 0.19 | 0.22 | 0.12 | 0.11 |

*Source*: Same as Table 2 and data for respective years.

an agency for the promotion and guidance of NR-based industries in Kerala.

## Notes

1 The factors attributed to the industrial stagnation in the state range from structural, historical and high labour costs. For a detailed discussion on the subject, see Subramanian and Pillai (1985), Issac and Tharakan (1986), *Report of the High Level Committee on Industry, Trade and Power* (1984).

2 Kerala's industrial structure is characterised by the dominance of industries with weaker inter-industry linkages and the absence of a sizeable share of 'foot-loose' type of industries in total value added and industrial employment.

3 Automotive tyre and tube industry is one among the five major industrial groups in the state. The share of the tyre and tube industry group in the total value added in the census sector of the state was 7.33 per cent during the year 1982-83 occupying the third position below fertilisers and pesticides and electricity.

4 For details see *Indian Rubber Statistics* (1987-88).

5 The share of the census sector in the total value of output of the rubber goods industry is around 84 per cent during 1982-83.

6 As opposed to the balanced growth theory, this approach emphasises technological relationship between different sectors as the prime mechanism of growth (see Hirschman, A O (1958)).

7 One of the main determinants of the linkages is the distribution of value added among the different factors of production. Historically, a major portion of the surplus created in the erstwhile tropical colonies was repatriated to the metropolitan countries. For a detailed account see Beckford (1972), Dawood (1980), Buchanan (1966), Melman (1963), Myint (1973), Elkan (1979), Munsi (1984), George and Tharakan (1986).

8 Structural changes in the rubber plantation industry are dealt in George et al (1988).

9 At present, Kerala accounts for around 87 per cent of the total area under rubber in the country.

10 Polythene sheet is the rainguarding material used by the industry for tapping during the rainy season.

11 At the bottom it is the village-level dealers who purchase the NR from the growers who in their turn sell it to dealers operating at the towns. A majority of the final consumers have direct links only with the big dealers operating in the terminal markets.

12 The gross value of production of the industry is estimated to be around Rs 2,600 crore. The industry provides direct employment to about 50,000 people and indirectly over three lakh people. See *Tyre and Tube Industry* (1987) and *Productivity in Tyre Industry* (1989).

13 Among the 12 large units, eight units control around 72 per cent of total production of the tyre and tube in India as on 1988. See *Productivity in Tyre Industry*, op cit.

14 During the year 1986 following were the prices for four major inputs:

*(Price per kg)*

| Inputs | Indigenous Price | CIF Price* |
|---|---|---|
| SBR | 25.50 | 10.00 |
| Polybutadiene rubber | 20.72 | 14.28 |
| Carbon black | 19.00 | 8.70 |
| Nylon fabric | 100.00 | 36.40 |

* Prices exclusive of duties.

15 Recently, there are at least two proposals to establish large units manufacturing titanium di-oxide outside the state in the private sector.

16 According to the Rubber Board's estimate, annual production of rubber seed is around 40,000 MT valuing Rs 4 crore. The data pertaining to seed cake and seed oil are also based on Rubber Board estimates.

17 See Haridasan (1977) for details.

18 In Tamil Nadu, groundnut oil processing starts only in late December.

19 During 1985-86 total production of honey in India was 5,480 MT of which honey originated from rubber plantations was estimated to be 2,280 MT. See Haridasan et al (1987).

20 Government intervention and a deficit supply of NR in the domestic market are considered to be the two important factors contributing to a steady remunerative price.

21 Unremunerative prices of tea compared to rubber is one of the main reasons for the large scale shifting. See Tea Board (1979).

22 According to a recent study even during 1978-79 Maharashtra, Gujarat, West Bengal and Tamil Nadu accounted for 55.49 per cent of the total value of industrial production, in the country. See Bharadwaj (1982) and V Surendar (1986).

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