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## **Input Delivery, Processing and Marketing of Natural Rubber: The Role of Producers' Cooperatives in Kerala**

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### **Abstract**

The Indian rubber plantation sector is dominated by small holdings, which account for almost 93 per cent of the total rubber production in the country. Small rubber growers suffer from problems like low productivity, poor quality of processing and weak marketing system. The prevalence of smallholdings makes the sector vulnerable to fluctuations in price, exploitation by middlemen, etc. To overcome the problem of small rubber growers, the formation of cooperatives called Rubber Producers' Societies (RPSs) was suggested. The present study has assessed the role of RPSs in providing services for input delivery, processing and marketing of natural rubber in Kerala. The study has revealed that RPS members have a lower cost of production and better price realization for their product compared to non-members. Group processing and community smoke house facility help in production of good quality rubber sheets. Key services provided by RPSs have been identified using factor analysis technique under five major categories, viz. marketing, financial, efficiency, infrastructural and social factors.

**Key words:** Rubber producers' societies, input delivery, natural rubber, Kerala

**JEL Classification:** Q31, Q01

### **Introduction**

India is the fourth largest producer and the second largest consumer of natural rubber. Despite not being a very favourable region for growing natural rubber, India continues to record the highest productivity among the major natural rubber producing countries (Economic Survey, 2011-12). The rubber plantations occupy 0.4 per cent of the gross cropped area and contribute 0.19 per cent to the national GDP. The country has considerable potential to expand rubber-based industries due to indigenous availability of raw material, fast growing automobile market, scope for value-addition and avenues for export. Kerala accounts for 78 per cent of the area and 90 per cent of the production of natural rubber in the country. Natural rubber forms the back bone of commercial agricultural

scenario of the state and rubber plantations have profound influence on the economic and social status of the people. The relative shares of smallholders (< 2 ha) and estate (> 2 ha) in the total production of natural rubber in the state for the period 1970-71 to 2008-09 are presented in Table 1. There has been a steady decline in the contribution of estates to natural rubber production during the past four decades and it came down to around 7 per cent in 2008-09.

Rubber production of the country is contributed mainly by the smallholders. There are more than one million smallholdings accounting for 88 per cent of the total area and 92.5 per cent of the total rubber production. Transfer of appropriate technology on seasonal basis to the vulnerable section of the rubber planting community in an intelligible manner, coupled with timely delivery of quality inputs and equipments at cheaper rates is perhaps the major criterion that would help maximize production and productivity of

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**Table 1. Production system-wise contribution of natural rubber in Kerala: 1970-71 to 2008-09**

Year	Production (tonnes)		Contribution (%)	
	Smallholders (< 2 ha)	Estates (> 2 ha)	Smallholders (< 2 ha)	Estates (> 2 ha)
1970-71	86773	40633	68.11	31.89
1980-81	140320	45400	75.55	24.45
1990-91	307521	61115	83.42	16.58
1999-2000	572820	77665	88.06	11.94
2004-05	696513	64070	91.58	8.42
2008-09	737605	59550	92.53	7.47

Source: Rubber Board

rubber from smallholdings. Proliferation of these holdings year after year on the one hand and inadequacy of extension personnel to cater to the information needs of the rubber-growers on the other, have been imposing a severe constraint to enhance productivity. A group management system and cooperative effort only could help overcoming the existing problems, as the smallholders as ordinary growers do not individually have a direct influence on prices. With a view to overcome the problems that the small rubber growers experienced in marketing in 1986, the Rubber Board had suggested the formation of a grass root level organization in the villages called Rubber Producer Society (RPS). A RPS helps in technology transfer and provision of input delivery services. In addition, it helps in processing and marketing of rubber. The society acts as a link between rubber farmers and Rubber Board so that extension services could be channelized effectively through it.

The natural rubber processing standards in the country are in accordance with its domestic requirements. After the removal of quantitative control on the import of rubber in 2001, the indigenous rubber has to face the challenges from potential cheap import, and therefore the processing processes need to be standardized, which of course can be accomplished through RPSs. The situation also calls for empowering of smallholders to face the challenges of the WTO-mandated regime. Appropriate infrastructure will have to be developed in the rural areas for cost-effective rubber production, quality processing by imparting required training and ensuring access to essential information to the needy (Varghese *et al.*, 2006).

Keeping this in view, the present study was taken up to assess the role of Rubber Producer Societies in providing services for input delivery, processing and marketing of natural rubber in Kerala.

## Data and Methodology

The study was both exploratory and analytical, involving qualitative as well as quantitative methods. A primary survey of rubber growers who have practical experience was used for materializing the study. In Kerala, districts of Kottayam and Ernakulam together account for 32 per cent of area and 35 per cent of production of rubber (Farm Guide, 2012). Hence, these districts were selected purposively for collecting primary data on the role of Rubber Producers Societies in input delivery, processing and marketing of natural rubber.

From each district, four villages were selected — two with effectively functioning RPSs and two without RPSs. From each village, 15 rubber-producing farmers were randomly identified. A total of 120 farmers comprising 60 RPS members and 60 non-members were surveyed in the state. Rubber farmers who were members of *Valakom* and *Kunnackal South* RPSs were surveyed in the Ernakulam district. The non-beneficiary farmers were selected randomly from *Paipra* and *Anicadu* villages of the same district. In the Kottayam district, farmers from *Chirakkadavu* and *Aymanam* villages having RPSs and *Madapally* and *Champakara* villages without RPSs were surveyed. The field survey pertained to the year 2011-12.

## Factor Analysis Technique

Factor analysis technique was used to discern the key services provided by the RPSs to the rubber farming community. The analysis provides a means of identifying and measuring the relationships or basic patterns in the dataset (Nagabhushanam and Hiremath, 1990). It was carried out using the principal component axis model of factoring (Hotelling, 1933) which is expressed as:

$$Z_j = a_{j1} F_1 + a_{j2} F_2 + a_{j3} F_3 + \dots + a_{jq} F_q \quad \dots(1)$$

where,

$Z_j$  = Magnitude of the indicator  $j$ ; *i.e.*  $j^{\text{th}}$  principal component or factor in the model,

- $a_{jq}$  = The factor loading of the  $q^{\text{th}}$  indicator in the  $j^{\text{th}}$  principal component or factor,
- $F_q$  = The amount of association in magnitude of indicators, the uncorrelated trait measured by factor  $q$  which is possessed by the indicator  $j$ ,
- $j$  = Factor loading with reference to indicators (1, 2, 3...,  $q$ ),
- $q$  = A set of indicators in the model (1, 2, 3...,  $q$ ), and
- $a_{jq} F_q$  = Factor coefficient or loading of indicator  $j$  on factor  $q$ .

The unrotated factors are difficult to interpret and often do not give meaningful pattern of variables, hence a new set of variables was generated by rotations. The Varimax Rotation method (Kaiser, 1958) was used which maximizes the variance of factors in the matrix and contains several high or low loadings. Factor loadings with more than or equal to 3- times the standard-error were considered for the inferences. The inferences were drawn on the basis of factor loading ( $< 0.50$ ) in the final loading matrix by using the following standard- error (Harman, 1967):

$$\sigma_a = \frac{1}{2} [(3/r - 2 - 5r + 4r^2) / N]^{0.5} \quad \dots(2)$$

where,

$\sigma_a$  = Standard-error of factor loadings,

$r$  = Average value in correlation matrix or factor loadings, and

$N$  = Number of observations.

## Results and Discussion

The Plantation Enquiry Commission appointed by the Government of India in 1956 examined the marketing problems of the small growers and observed that 'what is needed is a chain of primary co-operative societies to provide service of maintaining smoke houses for taking delivery of the latex of smallholders and making smoked sheets of uniform and good quality'. Hence, the Commission wanted to establish village level co-operative societies (Plantation Enquiry Commission Report, 1956). The Small Holding Economic Enquiry Committee' appointed in 1967 under the chairmanship of T. M. Abdullah, also studied the problems of rubber industry, giving due importance

to small rubber growers. The Committee identified the problems of the small rubber growers as uneconomic size of holdings, lack of scientific knowledge in cultivation practices, lack of processing facilities and absence of small growers' organizations to keep them alive to common problems (Abdulla, 1967).

For capacity building of small rubber growers in processing and marketing, the Rubber Board launched a massive programme for organizing in each village a Rubber Latex Collection Centre modelled on the AMUL pattern of Gujarat. These collection centers were later turned into Rubber Producers' Societies. A Rubber Producer Society is a co-operative society with a group of 50 to 300 small growers residing in a locality registered under the 12<sup>th</sup> *Travancore Cochin Literary, Scientific and Charitable Societies Act* of 1956.

## Services Provided By Rubber Producers' Societies

The RPS provides different services such as collection of latex, sheets and scrap from the members and selling them at remunerative prices to the processors. The Rubber Board supplies the necessary equipment such as platform balance to weigh latex, sheet and scrap. These services are crucial as they constitute the income base of small rubber growers. Even though there are differences in the extent of services rendered by the diverse RPSs, they have a critical role in different spheres of the life of small rubber growers.

## Input Services

Input distributions, which are subsidized by the Rubber Board are now channelized through RPSs. Bulk purchases provide the scale economy. The inputs distributed include straight fertilizers of NPK, polythene sheets and adhesives for rain guarding, plastic cups, head lights, hand sprayers, panel protectants, fungicides, spray oil, power sprayers, etc. For constructing community smoke houses, subsidy is provided. Rubber Board supplies the necessary equipments such as platform balance to weigh latex, electric oven to dry sample coagulum for estimating dry rubber content, chemical balance to weigh the dried sample coagulum to find out the exact weight of dry rubber in the sample and other accessories required.

Rubber Board promotes formation of group nurseries through rubber producers' societies. Polybags

or plastic cups are provided free of cost to the RPSs by the Board, while budded good quality stumps are supplied at half the cost for planting. This initiative has helped the small rubber growers in learning the techniques of quality sapling production and has ensured their easy availability at prices lower than the open market prices.

### Processing and Marketing Services

The RPSs emphasize on activities which improve the processing and marketing facilities of small rubber growers. For members, training classes are conducted so that better grade rubber sheets could be produced. Facilities for processing good quality rubber are also provided on a group basis. It helps in producing sheets of uniform grade and export quality. The realization of higher prices for better grades has made the small growers 'grade-conscious', leading to improvement in the quality of the sheets. Arrangements for marketing of products like latex, sheets (grade-wise), field coagulum, etc. are also made by the RPSs. During the initial years of working, leading tyre manufacturers like Dunlop, Modi, Vikrant and MRF were directly linked with the RPSs to procure rubber sheets, but later the tax authorities impeded the practice and regarded it as a trade. To tide over this situation, the Rubber Board has set up private limited companies in all the regions under the joint participation of RPSs and the Board.

An innovative idea linked with this association is that the companies would provide necessary inputs like formic acid, plantation equipments, etc. and would help in raising the quality polybags or cup saplings for rubber growers. Each company would have 49 RPSs and the Rubber Board as shareholders, making the total shareholders 50, to be well within the stipulation of Company Law. In the case of processing factories, the crop from the members is collected mainly in the form of latex. The trading companies handle all the activities of processing companies, except the processing work.

A perusal of Table 2 reveals a considerable difference in the input costs of RPS-beneficiaries and non-beneficiaries. It was because most of the subsidy programmes of Rubber Board are channelized through RPSs and the economies of scale of operations also reduce the cost of production of RPS members. Also, the RPS members get quality seedlings from own nurseries at lower rates. Non-members have to purchase

**Table 2. A Comparison of average costs of inputs, processing and marketing of natural rubber across RPS beneficiaries and non-beneficiaries**

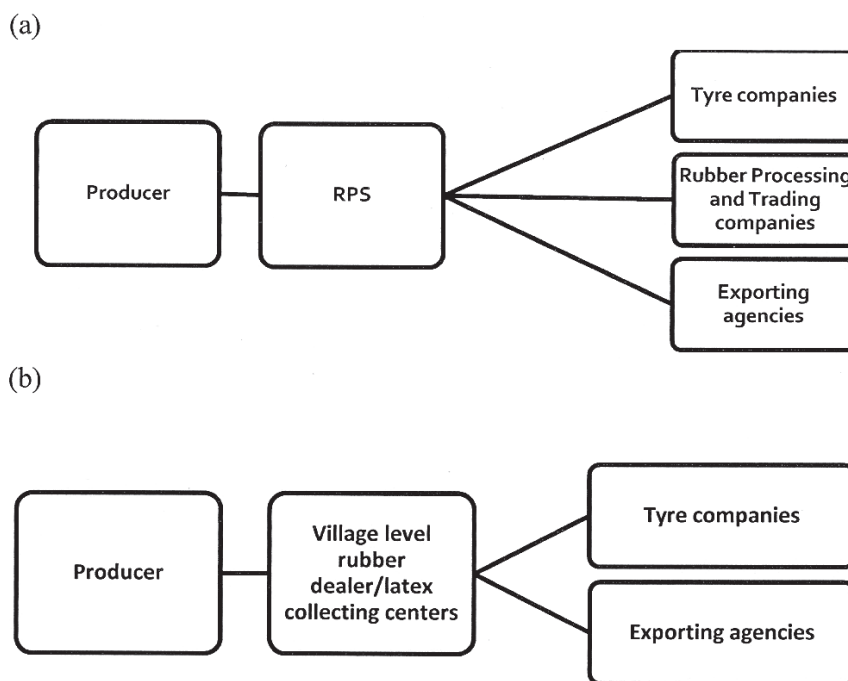
Variable	(₹/acre)		
	Beneficiaries	Non-beneficiaries	t-test
Input cost	69,234	91,359	-
Processing cost	-	7710	-
Marketing cost	-	985	-
Total	69,234	100,054	5.67*

*Note:* \*Significant at 5 per cent level (Items like labour charge; tapping cost, etc. were not included since these were same for both beneficiaries and non-beneficiaries)

rubber rollers and other equipments required for individual processing which adds to the processing cost. Since RPSs provide community smoke and storage houses, their members are benefited.

### Marketing Channels Identified for RPS Members and Non-members

It was found that the farmers of villages having Rubber Producer Societies provided latex directly to them who had employed collecting agents on commission basis for this purpose. This helped the farmers by way of saving on cost of transportation and time. The price of the latex was decided based on the basis of Dry Rubber Content (DRC). The producer-farmers got a price one to two rupees less than the market price. The RPSs having processing facilities processed the latex into good quality sheets, usually of RSS 1 grade (best quality). RPSs also provided the facilities of community smoke and storage houses to store the rubber sheets without deterioration in quality and fungal attack. The RPSs not having processing facilities, sold the processed latex directly to any of the three channels displayed in Figure 1a, viz. tyre companies, rubber processing and trading companies or exporting agencies based on the prices and ease of transportation. The profit obtained from the sale of quality grade sheet after meeting the processing costs, was equally divided among the member-farmers. Proper grading, economies of scale in the bulk transportations, and bargaining power helped the members to realise better prices. Thus, RPSs were a strong support in the marketing of natural rubber.



**Figure 1. Marketing channels for rubber latex/sheets in villages (a) with RPS and (b) without RPS**

In the villages without RPS, an individual producer usually processes the latex into sheets. These sheets, usually of low quality (RSS 4 & RSS 5), were sold to the village level rubber dealers or private latex collecting centres (Figure 1b). The chances of exploitation were higher in this channel. Price realization was also low or due to weak bargaining power of individual farmer-producer. Additional cost of individual smoking house (₹10000/ha) and drudgery associated with sheet processing was also associated with this channel.

**Benefits of Rubber Marketing through RPSs**

**Improvement in Rubber Sheet Quality**

The shift from homestead processing to group processing has brought about remarkable improvements in the quality of rubber sheets. Most of the sheets produced by the RPSs were of RSS 1 (best) grade. The production of RSS 5 (lowest grade) by the RPS members was minimum in all the three regions as can be seen from Table 3. The RPSs ensured that no ungraded sheet came out of their smoke house. The bulk of production from *Kunnackal South*, *Aymanam* and *Chirakkadavu* regions was of RSS 1 grade whereas in *Valakom* region, RSS 4 was the major grade produced.

**Table 3. Production of different grades of rubber sheets in different RPSs during 2010-11**

(in kg)				
Region	RSS 1	RSS 4	RSS 5	Total
Valakom	8056	46398	-	54454
Kunnackal South	67856	7568	712	76136
Chirakkadavu	52965	8956	0	61921
Aymanam	48536	5778	0	54314
Total	1,77,413	68700	712	2,46,825

Source: Field Survey

The improvement in quality was conspicuous as the small rubber growers were not able to produce and market superior grades of rubber without adopting the group approach. The production of RSS 1 grade sheets before the implementation of group processing by the RPSs was absent. In *Paipra*, *Anicadu*, *Madapally* and *Champakkara* regions, individual farmers who were not members of RPSs, could produce sheets only of lower grades, RSS 4 or RSS 5. The RPSs with the guidance of Rubber Board’s extension officers were able to produce rubber sheets of desired uniformity in shape, colour, etc. essential for acceptance in the international market.

The major constraints identified in the RPSs producing good quality sheets were defects in the construction of smoke houses and pollution problem. Two out of the four RPSs had biogas plants to tackle the problem. There has been a significant change in the functioning of RPSs after the implementation of the scheme for model RPS by the Rubber Board and several RPSs have started group processing and marketing. However, only a few RPSs are found working efficiently and a large number of them had to improve their performance if they were to be of service to the rubber growers.

### Price Realization

The farmer-members whose latex was processed by the RPSs received a better price than the non-members who processed in the homestead. The improvement in quality coupled with their bargaining capacity enabled the RPSs to obtain a better price than individuals could get for their ordinary sheets. The difference in the average price realized by RPS-members (₹ 92.30/kg) and non-members (₹ 89.85/kg) was ₹ 2.47/kg in 2010-11.

### Factor Analysis for Figuring out Key Services Provided by RPSs

The factors which affect the services provided by RPSs on improving the social and economic status of small rubber farmers were figured out using factor analysis technique (Ford *et al.*, 1986). Table 4 presents all the factors which were extractable from the analysis along with their Eigen values, the percentage of variance attributable to each factor, and the cumulative variance of the factor and the previous factors. The first five factors could explain approximately 80 per cent of total variance. This value corresponds to a relative high representation of the variables by five factor model. First factor explained 21 per cent of the total variance (Table 4) and this factor had strong positive loadings for better price realisation, improved bargaining capacity, reduction in intermediaries, linking processing and marketing and linkage with export agencies (Table 5). These high loadings represent a relative high correlation between each other. This reflects the positive influence of RPSs on marketing of smallholders' produce and hence could be considered as '*marketing factors*'.

**Table 4. Total variance explained**

Components	Initial Eigen values		
	Total	Percentage of variance	Cumulative percentage
1	2.737	21.055	21.055
2	2.562	19.706	40.761
3	2.182	16.782	57.543
4	1.596	12.273	69.816
5	1.364	10.489	80.305
6	0.719	5.530	85.835
7	0.649	4.989	90.824
8	0.432	3.324	94.149
9	0.288	2.212	96.361
10	0.193	1.488	97.848
11	0.119	0.916	98.764
12	0.113	0.866	99.630
13	0.048	0.370	100.000

Extraction Method: Principal Component Analysis

The second factor explained the 19.7 per cent of variance (Table 4) with strong loadings on financial assistance and credit services. The relationship between these variables reflects the significance of financial services provided by RPSs and could be identified as '*financial factors*'. The third factor with high loading values for input services and uniform high quality sheets could be considered under '*efficiency factor*' and the fourth factor with high positive loading values for community smoke houses and storage facilities could be termed as '*infrastructural factor*'. The fifth factor with loading values for training and assistance to family members could be identified as '*social factor*'. Thus, the various services were grouped under five major categories, viz. marketing, financial, efficiency, infrastructural and social factors.

### Strengthening the Performance of RPS

The co-operative model of activity is the basic strength of a RPS. The technical as well as financial support provided by the Rubber Board in the form of trainings and expert services improves the performance efficiency of RPS. The infrastructural facilities for group processing and storage and provision for community smoke houses help the societies to perform well. These strengthen the RPSs to be effective in delivering input services to its member farmers.

**Table 5. Loading for varimax rotated component matrix of five factor model**

Components	Factors				
	Marketing	Financial	Efficiency	Infrastructural	Social
Better price realisation	0.932				
Improved bargain capacity	0.940				
Reduction in intermediaries	0.928				
Linking processing and marketing	0.812				
Linkage with export agencies	0.740				
Financial assistance		-0.915			
Credit service		0.868			
Input service			-0.842		
Uniform high quality sheets			0.904		
Storage facilities				0.851	
Community smoke houses				0.891	
Giving training					0.923
Assistance to member families					0.585

Extraction Method: Principal Component Analysis

Linkages with rubber processing and trading companies (RPTCs) ensure a regular demand for the produce and the input service by the companies at subsidized rate helps the members of RPSs to be in an advantageous position. Economies of group purchase, own quality sapling nurseries, better bargaining capacity and price realizations, etc. are the strengths of RPSs.

### Extraction Method - Principal Component Analysis

The RPSs can also start 'trained labour banks' so that the problem of severe labour shortage can be avoided. More societies could be linked with RPTCs so that effective marketing is ensured. Though there exist threats of severe competition from local and private traders, RPSs can act as an agent of change to uplift social and economic conditions of the smallholder rubber grower community.

### Conclusions

The study has been focused on the rubber growers of Kerala, specifically the small rubber growers who are the members of the Rubber Producer Societies (RPSs). The RPSs have been found effective in transferring new technologies generated by the Rubber Board. These Societies provide good quality inputs at a subsidized rate due to the financial support from the

Rubber Board. Linkages with rubber processing and trading companies (RPTCs) ensure availability of inputs at a cheaper rate. In addition, the linkages are helpful to smallholders in the processing and marketing of rubber.

The study has shown that there exists a significant difference in the costs on input, processing and marketing between RPS beneficiaries and non-beneficiaries. Marketing channels have been identified for rubber farmers who are members of RPSs and who are non-members. It is found that marketing channels that included Rubber Producer Societies are more efficient since exploitation by the middlemen is nil or comparatively low. A comparison has revealed that RPSs help its member-farmers in getting better prices. Group processing facilities are quite effective in improving the quality and uniformity of rubber sheets and in reducing individual farmers' drudgery. Community smoke houses provided by RPSs reduce the cost of building individual smokehouses. The various services have been grouped under five major categories, viz. marketing, financial, efficiency, infrastructural and social factors. Production of uniform export quality sheets through combined efforts would help the producer-farmers to fetch better prices. An integral approach aided by the RPSs would be beneficial to the stakeholders as it will promote closer interaction among them and foster better understanding of each others strengths and weaknesses.



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