Rubber Wood Production and Utilisation in India

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Introduction

The emergence of rubber wood (*Hevea brasiliensis*) as one of the alternatives for the traditional sources of timber in the world market since 1980s is closely related to the structural changes in world trade in timber and timber products and developments specific to the natural rubber (NR) production sector. An important feature of the global trade in timber is the geographical concentration of exports as the estimated share of developing countries in the world exports is around 70 per cent. The dynamic growth and changes in the global timber market since mid 1980s are major exceptions to a relatively staggered performance of agro-based products and raw materials exported from the developing countries. The positive trends are more evident from a marked increase in the weighted index of world timber price by 39.8 percentage points against the decline of other agricultural raw materials exported mainly from the developing countries during 1980-99 period (Table 1. World Bank, 2000). The four cardinal features of the changes in the world timber economy since early 1980s are: (1) progressive change in the structure of exports from developing countries characterised by a remarkable shift from unprocessed to value-added processed and finished wood products, (2) steady increase in the concentration of markets in EEC, Japan and USA, (3) increasing exploitation of tropical hardwood varieties and consequent depletion in the stock and (4) growing concern on the conservation of environment. The cumulative effect of these developments was a substantial increase in the prices of tropical sawn wood and the consequent efforts to identify environment friendly alternative sources of timber. Concurrently, the NR production sector was also undergoing structural changes having the potential of far reaching implications in terms of reorientation of the priorities and strategies arising from the erosion of the relative profit margins and declining terms of trade (Joseph and George, 1994). The response, though varied across the major NR producing countries, is unique in exploring the potential outlets for increasing net income per unit of area and capitalising available opportunities for squeezing unit cost of production. Among the net income augmenting measures, commercial exploitation of rubber wood was one of the major components although the extent of value addition and net gains vary among the major NR producing countries.

Table 1. Weighted price indices of agricultural raw materials at current US $ (1990 = 100)

	1980	1999
Agricultural raw materials	104.6	88.5
Timber	79.0	118.8
Agricultural raw materials other than timber	122.0	72.7

Source : World Bank (2000)

Apart from the favourable objective circumstances prevailing in the world timber market and the NR production sector, there were at least two other features inherent to rubber wood leading to the dynamic growth in its commercial exploitation. The most distinctive feature of rubber wood is that it is a renewable by-product of rubber plantations. In an operational sense, the supply of rubber wood is inexhaustible as the plantations are maintained on a sustained yield rotation of 25-30 years. Another important feature is the development of appropriate processing technologies capable of improving the inherent properties of rubber wood amenable to various industrial applications. Consequently, the commercial exploitation of rubber wood assumes added significance as it substitutes the conventional hardwood species on a variety of end uses and contributes to the environmental conservation. The estimated rate of deforestation in the developing countries is 16.8 million hectares per annum (FAO 1993) and it has been reported that 0.6 million hectares

of tropical rain forests can be conserved with the utilisation of economically available rubber wood on an annual basis (ITC, 1993). If all the available physical potential of rubber wood were used, it is estimated that an additional 0.3 million hectares of tropical rain forests could be saved.

The major industrial applications of processed rubber wood consists of furniture, panel products, joinery products, household articles, floor tiles and mouldings. A recent development is the peeling of rubber wood for the manufacture of plywood. The potential products to be manufactured from the timber are activated carbon and charcoal. The current estimated size of the world market for rubber wood based finished products is around US $ 1.5 billion. Among the major NR producing countries, Malaysia and Thailand are relatively more successful in terms of the scale of operation, level of technology employed, variety of products manufactured, pattern of exports and volume of export earnings compared to Indonesia, India and Sri Lanka. During the last 20 years there has been a progressive shift in the structure of rubber wood exports from the NR producing countries reflecting value-addition in terms of the steady increase in the share of finished products compared to processed sawn wood. The major markets are the USA, Japan and EEC and the major form of imports is furniture and furniture parts with a relative share of more than 74 per cent (ITC, 1993).

Production potential

The rubber wood production depends mainly on planting stock, agro-climatic conditions, management practices and decision on replanting. The world growing stock of rubber wood including trunks and branches above a minimum diameter of 5 cm is estimated at 866 million cu.m (ITC, 1993). However, only about three quarters of the physical production potential is reported to be utilised for industrial applications due to infrastructural and locational constraints, size of the holdings and quality of the logs. Production consists of two types of wood, viz. logs and fuel wood. Logs consist of raw material for sawmilling and plywood manufacturing having a minimum diameter of 15 cm. Fuel wood includes all wood of smaller dimensions down to a top diameter of 5 cm which can also be used for chips and pulping. The annual world physical production of rubber wood during 1993-98 period was estimated at 41 million cu.m of which 11 million cu.m. would be logs (ITC, 1993). The production potential is gradually expected to increase up to 52 million cu.m. by the period 2016-2021 and the log output could reach 14 million cu.m. per annum (Table 2).

Table 2. Region-wise physical annual production potential of rubber wood ('000 cu. m./ year)

Region/period	1998-2003		2004-09		2010-15		2016-21	
	Logs	All	Logs	All	Logs	All	Logs	All
Asia	9816	37493	10693	41631	11995	45276	13257	48330
Africa	1141	3287	624	1943	452	1485	718	2308
Latin America	130	561	314	1414	402	1730	307	1233
World Total	**11087**	**41341**	**11631**	**44988**	**12849**	**48491**	**14282**	**51871**

Source: ITC(1993)

Notes: Logs - Rubber wood suitable for sawing/peeling
All - All trunks and branches of rubber wood above a minimum diameter of 5 cm.

India is the fourth largest natural rubber producing country in the world and the area under crop has been exhibiting steady increase since 1955. The annual average compound growth rate of the area is 4.65 per cent and the current estimated area is 553000 hectares. Field level investigations revealed that over time the production of rubber wood per unit area is declining mainly due to the steady increase in the share of high yielding varieties of planting materials with higher latex production and lower timber content. The current estimated average production of rubber wood/hectare is

150 and 180 cu.m. in the rubber small holdings and estates respectively. Table 3 shows the projections on rubber wood production in India from 2000-01 to 2014-15 based on the historical planting and giving due allowance to the changing proportions of the conventional seedling materials with a relatively higher timber content and the high yielding varieties of planting materials in the total tree population (Appendix I). It is evident from Table 3 that till the year 2011-12 the production potential would be steadily increasing and thereafter the availability is likely to register a significant decline due to the slowdown in rubber planting during the early 1990's. The projections underline the need for a scientific approach in analysing the commercial utilisation of the available production potential as India is a timber deficit country importing wood and wood products worth Rs. 15720 millions per annum (DGCIS, 1998). The structure of imports is characterised by the dominance of rough wood with a relative share of 91.4 per cent in the total value of imports. Table 4 shows the salient features of wood imports into India.

Table 3. Projections of the availability of rubber wood in India ('000 cu.m)

Year	All*	Stem wood	Sawn timber suitable for processing
2000-2001	1602	961	329
2001-2002	2073	1244	422
2002-2003	3135	1881	632
2003-2004	2904	1742	581
2004-2005	3219	1931	639
2005-2006	3193	1916	629
2006-2007	3568	2141	697
2007-2008	3908	2345	758
2008-2009	3913	2348	755
2009-2010	4236	2542	813
2010-2011	4179	2507	795
2011-2012	4357	2614	823
2012-2013	3865	2319	726
2013-2014	3869	2322	723
2014-2015	3241	1945	600

Source: Estimates of RRII

* Includes stem and branch wood

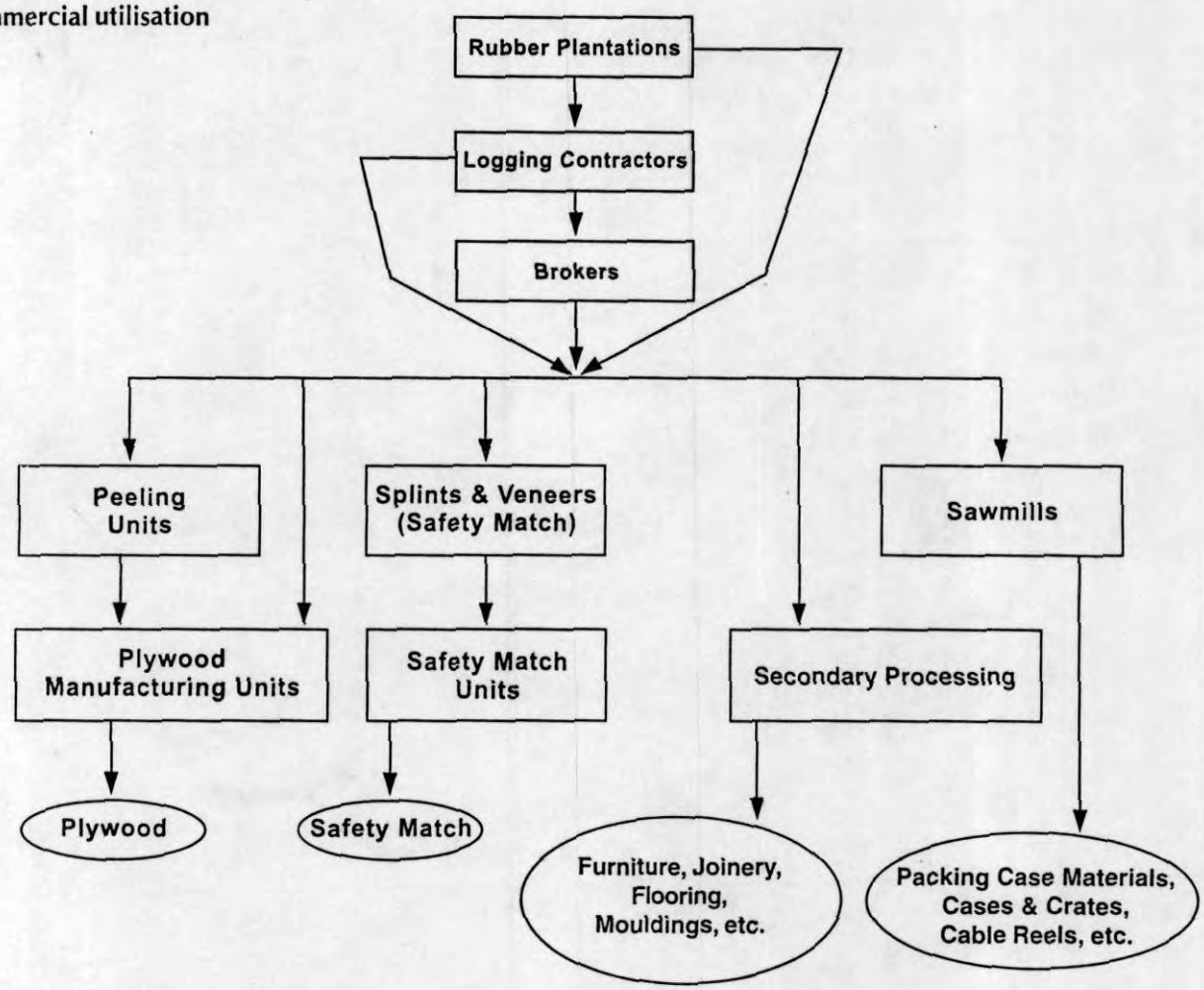
Table 4: Salient features of India's wood imports. (1997-98)

Total value of imports (Rs. Million)	Value of rough wood imports (Rs. Million)	Relative share of rough wood (%)	Major sources of imports	Relative share (%)
15720	14370	91.4	Malaysia	28.3
			Myanmar	18.6
			Nigeria	13.2
			Others	39.9
			Total	**100**

Source: DGCIS (1998)

India's current estimated annual requirement of timber is around 40 million cu.m for various industrial applications and the current availability is estimated at 29.25 million cu.m. Therefore, in an operational sense, the potential contribution of rubber wood (stem wood) to India's timber requirements is around two per cent. Moreover, based on the ITC estimate, rubber wood in India has the potential to conserve more than 20,000 hectares of rain forests on an annual basis. In this backdrop, a critical review on the current status of rubber wood utlisation in the country is essential to streamline the policy inputs required for the maximum value-addition to this valuable by-product of rubber plantations.

Commercial utilisation



The relative share of rubber stem wood available for various industrial applications is estimated to be 60 per cent of the total production and the remaining 40 per cent consisting of branch wood is mainly used for industrial and household firewood requirements in India. However, in Malaysia, even smaller sized logs and branches are reported to be utilised for the manufacturing of panel products such as chipboard, wood cement board and medium density fibre board (Teng, 1993). The consumption pattern of rubber stem wood in India presents a complex picture compared to the trends in Malaysia and Thailand. The main feature of the stem wood consumption in India is its highly skewed structure reflecting concentration in the commercial utilisation of the material in the manufacturing of less value-added products such as packing cases and inferior quality plywood. The estimated sector-wise shares of stem wood consumption in India during three time periods based on the field surveys undertaken by the Rubber Research Institute of India (RRII) arc given in Table 5.

Table 5. Consumption Pattern of stem wood (%)

Consuming Sector	1984-85	1993-94	1999-2000
Packing case	69.0	54.1	56.5
Safety matches	13.3	9.4	3.0
Plywood	13.3	24.0	26.5
Processed wood	2.2	10.5	12.0
Others	2.2	2.0	2.0

Source: Estimates of RRII

As evident from table 5, packing case and the plywood manufacturing industries are the two major consuming sectors with a combined share of 83.0 per cent even in 1999-00 although the relative share of the processed wood registered a steady increase from 2.2 per cent in 1984-85 to 12.0 per cent in 1990-00. This unique feature encompassing the commercial utilisation is highly inward market oriented and to a large extent historically rooted in terms of the structural changes related to the sources of supply and demand for the timber in the internal market and absence of compulsions for higher value-addition to rubber wood in India vis-a-vis other major NR producing countries. Historically, a major factor which tilted the rubber wood consumption pattern in favour of the packing cases and plywood since 1960's in Kerala (which accounts for more than 90 per cent of the rubber wood production) was the steady depletion in the stock of conventional sources of supply consisting of the species such as mango tree (*Mangifera indica*), jack tree (*Artocarpus heterophyllus*) and the anjili tree (*Artocarpus hirsuta*). On the demand side, there was a steady growth in demand for packing cases and plywood since 1960s from the major industrial centres as a corollary of the industrial growth in the country. Since late 1970s rubber wood, which is cheaper and inexhaustible compared to the conventional species increasingly filled the vacuum in the market for packing cases and inferior quality plywood. Moreover, the statutory control or institutional intervention in India was practically negligible compared with Malaysia and Thailand for maximum value-addition from rubber wood. The policy of minimum institutional intervention in India is in sharp contrast to the far reaching efforts and policy changes initiated in Malaysia and Thailand since 1980s to tap the potential income from manufacturing value-added products from processed rubber wood. Conceptually, it is plausible to surmise that the existing structure of the primary processing is a logical extension of the inward oriented market structure of finished products in the context of India's timber deficit position.

Primary processing

In the operational sense, rubber wood processing in India can be broadly classified into two, viz., primary processing and secondary processing. The primary processing consists of sawmilling and peeling whereas secondary processing represents processing the sawn timber for the manufacture of value-added products. The salient features of the primary processing sector are reflective of the relative shares of the end products in the total stem wood consumption. The two important features of the primary market are: (1) dominant role of intermediaries ranging from logging contractors to the sawmillers and (2) a comparatively lower level vertical integration in the industry. An important development in the primary market since 1980s is the growing control of the logging contractors operating at the level of the growers and auction centres before logs reach the sawmills or peeling units. Although, around 75 per cent of the rubber wood logs is routed through the main channel of logging contractors/brokers to the primary and secondary processing units, direct procurement from the rubber plantation by the peeling units, sawmills, splints and veneer manufacturing units, plywood manufacturing units and the sawn timber treatment units on a smaller scale is also observed. An earlier study (Joseph and George, 1996) reported that extent of direct procurement of the logs by the processing units is positively related to the scale of production, availability of end products manufacturing facility and proximity to plantations. In practice, it has been pointed out that the existing system of indirect procurement benefits the

processing units as it suits unit-wise size specifications leading to reduction in the wastage. This is in sharp contrast to a relatively higher level of vertical integration in Malaysia and Thailand where very often wastes are gainfully utilised in the highly developed panel products industry. The quality control aspect is given utmost importance from the stage of primary processing as the processing factories are either directly involved from the stage of logging operations or resort to subcontracting the sawing and the initial preservative treatment of the sawn timber.

An important feature of the sawmilling sector in India is a relatively higher average recovery rate of 64 per cent due to the practice of allowing 'tolerance' in the thickness of sawn planks and the utilisation of major portion for the manufacturing of packing cases. It was also observed that there were at least two important reasons for the reluctance on the part of the sawmills to process sawn timber for secondary processing viz., (1) a relatively lower recovery rate of 50 per cent and (2) inadequate supply of logs with higher girth. Another important observation of the study was a relatively lower average installed capacity of sawmills in India in the range of three to eight cu. m compared to ten cu. m in Malaysia in one eight hour shift. The sawmills processing rubber wood in India have an in-built arrangement to manufacture packing cases and packing case materials. One of the highlights of the study was that around 90 per cent of the sales of the sawmills consisted of packing cases and packing case materials whereas sawn planks suitable for secondary processing constituted only 10 per cent. Compared to the sawmills, the peeling units operated at a larger scale as evident from the average procurement of logs in the range of 4000 to 6000 MT per annum. An important feature of Indian rubber wood veneer processing sector is that hardly 25 per cent of the units has the basic treatment facility in terms of dip treatment and mechanical drying. Another important feature of the primary processing sector is that only 20 per cent of the units has plywood manufacturing facility and the remaining 80 per cent of the units are engaged in peeling and marketing of the veneer. Moreover, compared to the sawmills, the peeling units are more dependent on the intermediaries who control an estimated 50 per cent of the volume of veneer sales.

Secondary processing

The relative share of the stem wood in the secondary processing sector (preservative treated and kiln dried) for the manufacture of value-added products is the main indicator of the degree of commercialisation of rubber wood as the extent of value-addition from the other consuming sectors such as packing cases, safety matches and inferior quality plywood is relatively lower. The gravity of the issue becomes more obvious when compared to the achievements of Malaysia and Thailand where not only the available sawn wood is chemically treated and dried for the manufacture of value-added products but also rapid strides were made in the diversification of exports and export earnings. Table 6 shows the pattern of exports and export earnings of Malaysia from the rubber wood based value-added products.

Table 6. Export earnings of Malaysia from rubber wood products

Products share (%)	Export earnings (in US$)	Relative share
Mouldings	19,698,158.32	3.00
Particle board	12,278,529.60	1.88
MDF	87,136,448.00	13.31
Furniture	535,612,372.48	81.81
Total	**654,725,508.40**	**100.00**

Source: Malaysian Timber Industry Development Board (Direct communication)

Table 6 clearly underlines the point that Malaysian rubber wood based exports consisted of highly value-added products and almost 82 per cent of the export earnings is from furniture. The dynamics of change in the composition of rubber wood based exports from Malaysia deserves attention as the evolution of the rubber wood sector from the position of basically primary exports to finished products exports within a decade is a major achievement. In 1985, about 81 per

cent of the sawn timber output in Malaysia was exported and more than 72 percent of the export earnings was from sawn timber (Ser, 1990). The pivotal factor in this turnaround was a well conceived Government policy intervention providing incentives to value-added exports and R&D efforts for technological upgradation of the downstream manufacturing and clearly spelt out regulations on sawn timber exports (Kadir, 1990). Although the objective circumstances leading to specific priorities and strategies for the rubber wood sector in Malaysia were operationally different from the Indian scenario, the development experience of this sector offers valuable guidelines relevant to the Indian context.

During the year 1995-96 there were 58 units engaged in the secondary processing of rubber wood in the country out of which 40 units are located in the state of Kerala. The salient features of the secondary processing units are furnished in Table 7.

Table 7. Salient features of the secondary processing units (1995-96)

Total estimated installed capacity	('000 cu. m)	= 57.79
Estimated capacity utilisation	(%)	= 50.27
Units having own sawmills	(%)	= 58
Units with attached downstream manufacturing facilities	(%)	= 48
Units exporting finished products	(%)	= 33

Source: Field survey conducted by RRII in 1996

India's scope for exploiting the untapped potential for value-addition arises mainly from the regional concentration of area under cultivation (86% in Kerala) and installed capacity (up to 69% in Kerala) for the secondary processing. This phenomenon of regional concentration is in tune with the specific locational advantages exploited by Malaysia and Thailand. However, the extent of capacity utilisation, vertical integration and export orientation of the industry in India are comparatively lower hindering the "take-off" phase of the industry due to a variety of factors. The major identified factors are the following:

1. Imperfections in the primary market for rubber wood logs leading to the inability of the secondary processing units to control the quality and price of the raw material;
2. Relatively lower effective recovery rates and higher wastage due to the absence of a well organised panel products industry consuming wastes and logs of smaller dimensions;
3. Comparatively higher prices of rubber wood logs in India (Appendix II) resulting in an in-built disadvantage for the processing industry compared to its counterparts in other NR producing countries; and
4. Marketing problems arising from the acceptability of finished products both in the domestic and world markets in the absence of a statutory authority to implement and monitor the standards for processing and quality control.

The emerging scenario has far reaching implications in terms of the inefficient utilisation/wastage of the available rubber wood logs and the dwindling supply of quality logs underlining the possibility of a future scenario of the primary market dominated by logs with lower girth and the inherent problems leading to further deterioration in the effective recovery rates. In this backdrop, the four important prerequisites for the sustained growth of this nascent industry appear to be:

1. Establishment of a promotional agency with regulatory powers supplemented with R&D facilities to implement and monitor the prescribed standards for primary processing, secondary processing and downstream manufacturing;
2. The agency may also provide institutional support in terms of market intelligence on the trends in the domestic and international markets and incentives for manufacturing value-added products;

3. Establishment of appropriate panel products manufacturing base to absorb the wastes and logs of smaller dimensions and to maximise effective recovery rates and
4. Formulating a long term plan for ensuring a regulated growth of the industry rather than promoting a mushroom growth of the secondary processing units having the potential of inhibiting the building up of an internationally competitive base in the long run.

The policy imperatives outlined are essential not only for the maximum commercial exploitation of the inexhaustible by-product but also to upgrade an essentially inward-oriented industry into a globally competitive one in the context of the growing process of market integration.

Appendix I Assumptions of projections of the production of rubber wood

	Estates	Small holdings
Life of plantations (years)	29	22
Immature phase (years)	7	7
Panel A duration (years)	5	4
Panel B duration (years)	5	4
Panel C duration (years)	5	3
Panel D duration (years)	5	3
Slaughter (years)	2	1
Final stand (No.)	245	265
Timber per tree (m^3)	0.73	0.57
Production per hectare (m^3)	180	150
Stem wood (% of total)	60	60
Sawn timber suitable for processing (% of stem wood)	35 in 1997-98 and 33 in 2014-15	35 in 1997-98 and 30 in 2014-15

The projections are based on the data on historical planting (Rubber Board, 1999)

Appendix II Price trends of rubber wood logs

Year	Price range (Rs./tree)	Average price (Rs./tree)	% change on the previous year
1987-88	100-135	118	-
1988-89	120-170	145	23
1989-90	150-220	185	28
1990-91	175-330	253	37
1991-92	150-310	230	-9
1992-93	200-375	288	25
1993-94	220-400	310	8
1994-95	310-600	455	47
1995-96	575-1200	888	95
1996-97	500-1100	800	-10
1997-98	330-650	500	-38
1998-99	300-600	425	-15
1999-00	300-600	425	0

Source : Estimates of RRII

Appendix III Current and potential value addition in Indian rubber wood sector

Log level value of stem wood (Rs. crores)	:	211.13
Current gross value added (Rs. crores)	:	836.26
Potential gross value added (Rs. crores)	:	3506.12
Current net value added (Rs. crores)	:	625.13
Potential net value added (Rs. crores)	:	3294.99
Potential value added foregone (Rs. crores)	:	2669.86
Current extent of value addition (%)	:	296.00
Potential extent of value addition (%)	:	1561.00

Note: The estimates are based on information on current and potential pattern of consumption of stem wood, extent of value addition, recovery rates and waste disposal and prevailing prices of logs of different girth measurements and different types of rubber wood based end products in the world market.