SUMMARY

During the good many years since the first plymill was set up in Assam in 1917 and until imports of tea chest plywood panels were banned in mid 1957, prolonged huge supplies of this material from overseas rendered the plywood industry in India almost crippled. The phenomenal rise in consumption of commercial plywood and the startling growth of this industry in this country are relatively recent developments. The vast untapped domestic market and sizable export opportunities are indicative of a promising future; yet, beset with multiple maladies, this labour-intensive industry is languishing in the midst of a deep crisis. Thus, the emergence of this industry as also its prospects, problems and probable solutions are of interest in this research work.

Chapter - I : Introduction - Plywood & Wood-based Panels

In 1865, one John Mayo in the USA first took a patent for his invention of a fabricated material of glued veneer sheets that much later got the now popular catchword "plywood". During 1885-90 commercial production of this veneered material started in the USA and in a small factory in Reval, Estonia (USSR).

The plywood technology has since undergone a sea change with many a refinement and innovation. The top ten consumers of plywood now (1986) are the USA, Canada, Japan, Holland, Denmark, Great Britain, Belgium-Luxembourg, Sweden, West Germany and France.
The USA, Japan, Indonesia, the USSR, Canada, South Korea and Finland are the world leaders in plywood production today. The major exporters (1986) of plywood are Indonesia, Finland, Singapore, the USA, Malaysia, Canada, Brazil, the Philippines, South Korea and Japan in that order.

Uses & Advantages:

Glued veneered panels are called plywood as a generic term. Other panels, namely stoutheart, veneered cambo-board, laminboard, blockboard, flushdoor, and batterboard, etc. having almost common characteristics and properties as that of a three- or multi-layer veneered panel are also classified as types of plywood. The speciality products include moulded plywood, tea chest plywood, marine plywood, shuttering plywood, aircraft plywood, fire-retardant plywood and flameproof plywood, etc. Ordinarily, plywood panels for interior uses are bonded with urea-formaldehyde and those for exterior application with phenol-formaldehyde, phenol-resorcinol or melamine-urea-formaldehyde preparations.

Plywood has multifarious applications in packaging, domestic as well as office fittings and furniture, walls, ceilings, flooring, stairways, partitions, radio and TV cabinets, sewing machine boxes, toys, trays, chair seats, table tops, make-shift camps, motor vehicles, train and tram compartments, aircraft, ships, rafts, boats, sports goods, concrete shuttering and a host of other purposes.

Light weight, flexibility and minimal wastage are some
of the major characteristics that contribute to its ready-to-use adaptability. As none of the substitute materials can match with unimitable wood, Nature's abounding gift, plywood not only embodies the unique qualities of wood but is also more durable and less wasteful than sawn timber.

Other Wood-based Panels:

A variety of reconstituted wood-based panels have been developed in recent times and these include particleboard, fibreboard, medium density fibreboard (MDF), waferboard, oriented strandboard (OSB), cement-bonded particleboard, flakeboard and the newest one laminated veneer lumber (LVL).

Chapter - II: Plywood Industry in India - In Retrospect

Growth:

The plywood industry in India owes its origin to the tea industry in this country. With the steady rise in production and export of tea, also grew the imports of plywood tea chests into this country. The First World War having caused serious interruption in supplies from overseas, at the initiative of a number of tea planters a plywood plant was first set up in Assam in 1917. Soon after the war was over, resumption of free imports of tea chest plywood jeopardized the growth of the local plywood industry. The Second World War (1939-45) again cut off tea chest imports and there occurred a marked growth of tea chest plywood manufacturing activities in India. Following cessation of Second World War conflicts, plywood imports resumed to the detriment of the indigenous industry. On the question of granting protection -
as the local plywood industry pleaded for time and again against regular huge imports of plywood - enquiries were held by the Indian Tariff Board in 1927, 1947, 1950 and later by the Tariff Commission (following promulgation of Tariff Commission Act 1951) in 1952, 1957 and finally 1960. But it was only after the Independence that the industry was granted a package of concessions. With effect from July 1957 imports of plywood tea chests were completely banned and in that year synthetic resin was introduced in India for the first time.

The number of plymills in India expanded from one in 1917 to three in 1938, fortyfive in 1950, two hundred and eight in 1975 and three hundred and fiftynine in 1986. Assam, with 66 plants, accounted for almost 60% of total commercial plywood and West Bengal, having 91 units, for about 93% of tea chest plywood produced in the country in 1986. During that year, the estimated aggregate production of plywood and decorative veneers (all sorts) was of the order of 210 million square metres. However, licensing of new units for plywood or any other wood-based panels regardless of size and capital investment has been suspended with effect from July 1, 1988.

Barring four public sector plants - one each in Kashmir, Kerala, West Bengal and Orissa, and one joint-sector unit in Karnataka - by and large the plywood industry in India is almost entirely dominated by the private sector. During the same year Indian export of plywood and veneer sheets was recorded as Rs.84.80 million and the excise revenue from this industry was to the tune of Rs.378.7 million.
Chapter - III: Analysis of Selective Economic Indicators
(Plywood Industry in India)

Authentic financial and operational details of most of the
plywood units - owned and managed by groups comprising close family
members and or acquaintances - are not made public. Some selective
economic indicators giving an overview of the plywood industry in
India for the years 1975-76 to 1981-85 have been collated from the
data available in Annual Survey of Industries, published by the Mi-
nistry of Planning, Government of India. Except for the macro-level
estimates released by the Planning Ministry, no other adequate, accu-
rate, homogenous and comparable data are available from any published
or unpublished sources. This precludes a micro-level analysis of the
production cost of each kind of the whole range of plywood panels ma-
ufactured in India.

However, the aggregate investment in plywood industry en-
larged from Rs.371.7 million in 1975-76 to Rs.1050.8 million in 1981-
85 - on average an 18% rise annually. Over these years, the ratio of
total investment to fixed capital remained at around 2:1, but that of
total investment to working capital declined from 3:1 to 2.1:1. The
collective gross output (value) registered a 23.7% average yearly
growth from Rs.589.1 million in 1975-76 to Rs.1987.8 million in 1981-
85. Production of plywood (all kinds) nearly doubled from 15 million
square metres in 1975 to over 85 million square metres - a 9% annual
growth on average. The element of material cost as per centage of
total input cost was 83.8% in 1975-76 as against 84.1% in 1981-85 and
that in relation to wages declined from 10% to 9.4% during this period. The average estimated gross output (value) per worker per factory rose from Rs.33,100 in 1975-76 to Rs.88,400 in 1984-85, a yearly increase of about 16%. The total number of workers in the industry increased from 17,793 heads in 1975-76 to 22,882 in 1984-85, but the average number of workers per factory dropped from 85 to 64 over this period. The average wages per worker per factory increased by about 11.8% annually from Rs.2,330 in 1975-76 to Rs.5,780 in 1984-85. The average annual rise in operating surplus was around 17% from Rs.86.4 million in 1975-76 to Rs.342.9 million in 1984-85. The estimated return on investment, that is operating surplus as a percentage of total investment, went up from 23.2% to about 32.6% during these years.

During this period, the average annual growth in investment was over 18%, that in gross output (value) was 23.7% and the return on investment improved from 23.2% to 32.6%. Further, the gross output (value) per worker increased by about 16% annually. But the average yearly increment of wages per worker was 11.8% during this period.

Chapter - IV : Plywood Industry in India - Prospects
Tea Chest Plywood : 

The production of tea chest plywood being linked to the requirement of the tea industry, the higher the yield of tea the more is the demand for plywood tea chests. At least 50%, if not more, of the assumed total tea yield (950 million kgs.) or about 475 million
kgs should require plywood chests by the year 2000. For this, an estimated 10.6 million chests or around 17.2 million square metres of plywood would be required annually by 2000 AD, as against the current yearly production of around 13 million square metres (1986). Depending upon actual tea yield, the actual demand for plywood chests may still be higher by the turn of the century.

**Standard Plywood:**

Swelling urban population, rising standard of living, increasing per capita income as well as consumption-expenditure, consequent rise in demand for more household furniture articles, expanding television and motor vehicle industries, and ongoing rush in housing construction are expected to cause a voluminous rise in domestic demand for wood-based panels over the coming decades. According to the industry sources, the annual demand for standard plywood is expected to rise from 205.64 million square metres in 1990 to 253.96 million square metres in 1995 and 302.28 million square metres in 2000 AD.

**Export Market Outlook:**

As projected in a report released by the FAO of the United Nations, the yearly import requirements for "hardwood solidwood panels" (plywood and sliced veneer) of some of the key international markets by 2000 AD are estimated as follows: Canada 100 million square metres, the USA 750 million sqm, France 75 million sqm, West
Germany 100 million sqm, Great Britain 275 million sqm, other EEC countries 225 million sqm, Japan 725 million sqm and the Middle East 325 million sqm. The figures indicate the volumes in square metres on 4-mmellimetre thickness basis. Due to lower production costs, tropical hardwood plywood and veneers will continue to be among the major export items from the developing economies. The other items that have sizable demand in the developed countries include film-faced shuttering plywood; pre-finished standard plywood laminated with decorative veneer, paper, foil, or melamine; painted, grooved or cut-to-size panels etc.

Chapter V: Plywood Industry in India - Problems

Among the major problems that currently beset this industry are timber shortage, obsolete machinery, outdated technology, low product recovery, poor capacity utilization, dearth of qualified and trained technical personnel, increasing production cost, mushroom growth of small units and competing substitute materials.

Tea Chest Plywood:

Ordinarily logs having small lengths and narrow girths, chiefly utilized in making tea chest plywood, being available from mostly the social forestry schemes and, to some extent, the Government forest depots, timber shortage does not so far pose much of a problem to this sector.

There are strong doubts whether the multi-wall paper bags, of late introduced in India on an experimental basis, can make any
significant breakthrough in India in the foreseeable future. Yet, unless the plywood manufacturers initiate meaningful steps to offer cost effective quality products, alternative materials will make leisurely inroads into the domestic market.

Indian exports of plywood tea chests dropped from Rs.17.6 million in 1980-81 to Rs.0.70 million in 1983-84. Apart from political relation, middling quality and prohibitive landed cost are among the major factors that inhibit the growth of tea chest panel exports from India. As most of the major importers of this material have either set up plywood manufacturing units or are changing over to other alternative materials, the future outlook for export of tea chest plywood from India is far from encouraging.

Standard Plywood:

The present annual licensed capacity of this industry, including 37 recently approved plants, covers around 218 million square metres of plywood and 56.9 million square metres of decorative veneer. As projected by the industry, the annual demand for standard plywood should reach around 254 million square metres in 1995 and 302 million square metres in 2000 AD. The existing registered capacity of the industry does not seem to be adequate enough to meet the fast growing domestic requirement. Keeping in view low capacity utilization (rated around 62% in 1986), shortage of prime wood raw material, obsolete technology and poor labour productivity etc., production of standard plywood is likely to fall far short of the domestic demand in the
years to come. As of 1985, the average daily production per factory was about 72,951 square metres in the USA (softwood plywood), 21,061 square metres in France, 10,625 square metres in Japan and 8,851 square metres in West Germany, as compared with average 3,513 square metres in a DGTD unit and 183 square metres in a non-DGTD unit in India.

Timber Shortage:

In 1985, the plywood industry received an estimated 750,000 cubic metres industrial wood—a quantity sufficient only to the extent of 50% of its registered capacity. Out of 750,000 cubic metres, 60% or about 450,000 cubic metres were reportedly imported. Thus, the indigenous supply was barely adequate to cater to around 20% of the industry's timber requirement. Following the Government's recent tough measures to check deforestation, indigenous timber supply will become all the more critically short. Then, there is global outcry against the destruction of forest cover and most of the countries are now inclined to make the best of their depleting forest resources for their own industries. According to the industry sources, the value of timbers imported by the Indian plywood manufacturers in 1987 was estimated at Rs.150 crores. However, without a consistently impressive growth in plywood exports, the Government cannot afford the outgo of huge foreign exchange on timber imports for an indefinite period. For one reason or the other, timber supply from overseas will become steadily less shortly. Therefore, for the plywood industry in India
even to cater to the staggering domestic requirement, leave alone the export market, will be a demanding task.

Sluggish Export:

If the production fails to keep pace with the growing local consumption, the shortfall in supply entails a chain reaction, including galloping price rise. So long as the products sell well in the local market at a remunerative price, half-hearted export efforts cannot score an encouraging success. Indian exports of value-added plywood plummeted from a record Rs. 32.86 million in 1974-75 to Rs. 20.30 million in 1984-85. Medicore quality and prohibitive price have rendered the Indian plywood uncompetitive in the world market.

Antiquated Technology:

The plywood processing technology now practised in India is by and large the same what was imported in the wake of modernization during the late fifties. Antiquated machinery and out-of-date technology have given rise to immoderate timber yield, increased consumption of other inputs, low product recovery, poor quality and high production cost.

Investment Risk:

Timber shortage and simultaneous mushroom growth of too many small units, enjoying economical advantages over the large factories, have inevitably led to poor capacity utilization and harsh competition for survival. In consequence, the entrepreneurs are disinclined to
risk heavy investment on modernization.

Chapter - VI : Conclusions & Recommendations

The modern technological attainments have brought about a rapid growth of a number of new-innovation wood-based panel industries and sharp competition in wood panel markets. Simultaneously, advanced machinery and improved processing methods have made significant contributions towards higher productivity and competitiveness of the modern plywood industry. The present time plywood technology put to use in industrialized countries are based on the concepts of product optimization, input saving, reduced production cost and total quality control.

Indian Scene :

In India, the plywood industry has expanded manifold, yet by and large, the quality of plywood has not improved. This is attributable to primarily the vast domestic market, absence of quality consciousness among the local users, lack of governmental control, and, above all, obsolete equipment as also processing methods. Deepening timber shortage, under-utilized capacity and sharp competition deter the ply-mill owners from giving any serious thought over the induction of latest machinery and updated technology.

Plywood is expected to maintain its predominant position in the potentially large domestic market; but, prolonged complacency on the part of the local manufacturers will facilitate market penetration of more and more of the new-innovation panels.
Owing to lower production cost, standard plywood and sliced decorative veneer sheets are among the promising export products from the developing countries. Pre-finished panels, viz, particleboard, MDF or standard plywood overlaid with decorative veneer, paper (imitating natural wood grain), foil, melamine etc., or painted, tongued, grooved, embossed as per customers’ requirements have sizable export potential. Besides, value-added moulded knock-down furniture components and other speciality products made of waste veneers are also selling well in the major export markets.

Given the question of survival of the plywood industry in India, massive supply of industrial roundwood from overseas is unavoidable. But timber imports cannot continue for long unless the industry earns enough foreign exchange through exports of its products. High and uniform quality, and competitive price being the foremost sales criteria in the international market, towards a substantial growth in Indian exports of plywood, integrated export-oriented developmental strategies can accomplish a better and quicker result than the prolonged infant-industry protectionist policy pursued in this country.

Technology Upgradation:

Prolonged protection from foreign competition and consequent isolation from new technologies over the years have undermined the efficiency and competitive edge of this industry in India. Technological
competence being a significant determinant in the world market, technologi­
cal upgradation of the plywood industry here deserves immediate
priority. Both prohibitive price and unsalable quality are attribu­
table to worn-out machinery and obsolete manufacturing process. Eff­
orts should be expedited to identify obsolescence of technology in use
and promote operational efficiency through modernisation.

Another way to accelerate the pace of technological trans­
formation is to liberally allow foreign companies to enter into joint­
ventures with the Indian entrepreneurs. This will generate more domes­
tic competition and induce the local manufacturers get access to new
and emerging technologies. Modernization and competition will not only
lead to increased plant capacity, high product recovery and improved
quality but also go a long way to help this industry augment its pro­
duction base and thus cater to the fast-growing local demand as well as
sizable export opportunities.

Competitive Price Reduction:

Notwithstanding the entry of many new plywood factories as
also the current unrestricted imports of timber by the Indian manufac­
turers there has been no competitive reduction in prices of Indian ply­
wood. Rather, the prices of all types of plywood in the domestic mar­
et are much higher (almost double) than those prevailing in the inter­
national market. If prices are to come down, production must go up
substantially. And hence the indispensibility of modern processing
techniques and improved machinery.
Job Opportunities:

In some quarters apprehensions are expressed that introduction of new technology may gradually entail shrinkage of job opportunities. But so far, the industry's expansion has not been matched by a corresponding growth in employment opportunities. Moreover, for quite sometime, this ailing industry has been experiencing a stagnation of labour absorption. Added to this the present impasse, if allowed to protract unremedied, may even lead to the closure of many plywood factories - both large and small. There being no dearth of investible resources, a rejuvenescient plywood industry - aided by modern technology and with increased production as also higher turnover - should create more job opportunities, both direct and indirect, in production as also marketing operations.

Trained Personnel:

Although labour in India is relatively cheap, the deficient average per capita output accounts for higher labour overhead. It is through proper training and supervision of the workforce that absorption, adaptation and application of modern technology can be effectively managed. Production costs are to come down and output per worker has to increase and this calls for more trained and skilled supervisory personnel as also workforce. There does not exist in India any institute imparting advanced studies in all branches of wood-based panel technologies. Perhaps joint steps by the plywood manufacturers, Indian Academy of Wood Science (IAWS) and the Government can expedite the decision.
on the long outstanding proposal to set up an Indian Institute of Wood Sciences and Technologies.

**Indigenization of Machinery:**

Indigenization of machinery and equipment, if necessary with foreign technical collaboration, will hasten the pace of modernization of the wood-based industries in the country and at the same time be of considerable value to import substitution.

**Research & Development:**

In India, the research and development in the field of plywood and for that matter wood-based panel technologies cannot be said to have made any significant achievement. The R & D jobs must be directed towards a given target so as to ensure that the expenses and time spent thereon are not entirely wasted.

**Pragmatic Export Efforts:**

The long-term commercial success of any product depends upon its price, quality and durability and this principle is all the more appropriate in the international marketing. Steps may be taken to ensure that plywood exports are suitably controlled and closely monitored by the associations of plywood manufacturers and exporters. The Indian manufacturers may consider the marginal cost concept for export pricing and make determined efforts to track down and set aright the concealed deficiencies. Setting up 100% export-oriented units, with foreign technical and marketing assistance to begin with, may also be considered.
Industrial Wood Crisis:

Industrial wood supply is becoming critically short. The probable ways to meet this challenge are to: apply substitute materials for varied end-uses in which wood and wood-based panels are traditionally utilized, use non-conventional raw materials in wood-based industries, utilize wood judiciously and intelligently, make gainful use of wood residues and agricultural wastes through product diversification, and grow more wood.

Product Diversification:

A positive step towards saving the tropical forests is to encourage product diversification aimed at promoting substitution and saving of traditional wood raw material. In the manufacture of the reconstituted panels, rotten, split and twisted tree trunks, branches, leaves, barks, etc. are shredded into pieces and used up. In fact, the entire tree can be put to use and nothing goes to waste. There must be purposeful endeavours for productive use of non-conventional raw materials namely, rice husk, cotton stalk, jute stalk, bagasse, paddy straw and other agricultural wastes in the production of wood-based panels, including plywood. The existing plywood units should take the lead in the matter.

Commercial Forestry:

Forests are to be managed not for the sake of their conservation and protection alone, but at the same time to ensure sustainable
development of the natural resource base keeping in view the socio-economic needs and priorities of the country. In India, there exists enormous potential to grow more timber on the degraded as also less accessible forests and on the vast expanse of wastelands. Rural forestry, social forestry, pastoral forestry and agro-forestry outside the forest boundaries may go hand in hand with commercial forestry in the forest areas too under a broad-based forest policy.

As a short-term measure, imports of woodlogs may continue as long as the current OGL facility exists. The long-term future of the plywood industry in India is going to be in massive industrial plantations. As a major adjunct to commercial forestry, industrial plantations of fast-growing commercially and industrially important trees will generate more timber supplies and simultaneously contribute to employment opportunities as well as poverty alleviation programmes in rural areas.

Industrial Plantation:

Aided by modern plantation technology, preferably with foreign technical assistance to commence with, and with some kind of arrangements for overseeing the operation and management by the Government, widespread industrial plantations should be raised in India. Captive plantations, for the needs of wood-based industries rather than for the open market, should induce and involve people in growing trees for their own industrial use. From the stand point of making this
scheme effectual in this country, it would be worthwhile to assign the
task to few joint-ventures with the participation of the respective
State Governments (forestry being a State subject) together with the
Central Government on the one hand and the associations of the plywood
manufacturers on the other, instead of few plymill owners direct. As
a major thrust for the reforestation towards sustenance of the deli­
cate eco-system, low-value stagnating trees can be replaced by high-
value quick growing industrially useful species. India's national
forest policy should, therefore, be reoriented with a three-prong stra­
tegy underscoring greater emphasis on environmental protection, comm­
ercial forestry and massive industrial plantation.