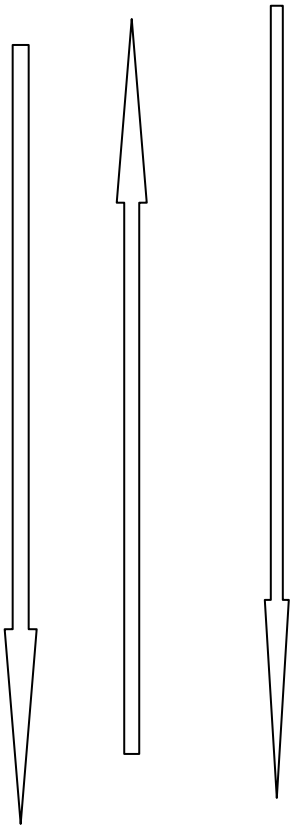
Action Plan target and details project Report
Under the "' ATMANIRBHAR BHARAT' for MSME Unit.

Title of the Model Project Teak fabricated round block to prepare a road Map to reduce the import of teak fabricated round blocks during the year 2020-21as per D.O.No 64(24)/D/VCMATTERs/2020-21/E dated 17.02.2021.



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Commercial details

Customs Organisation's (WCO) **Harmonized System** (HS) commodity code categories which involve international trade, **specifically in teak: 44034910 (teak wood in the rough) and 44072910 (sawn teak wood).**

1. **HSN code of the product:** - 44034910 and 44072910.
2. **NIC code of the product:** -27440101
3. **Clusters already existing on the product if any (Data from Cluster division of HQ):-**

Sl.No	Name of the cluster approved by D C (MSME)	Products	Location
1	Carpentry cluster	Table, Chair, Cot, Window	Churachandpur,Manipur
2	Carpentry cluster	Table , chair. Wood curved, Cot	Toluvi, Dimapur

Source of DC (MSME)

4. **Possibility to create establish cluster on the product:-**

a) Seasoning Facility b) Chemical Treatment Facility
c) Debarking of Logs d) Modern Joint Making Facilities
e) Panel Saw, Cross Cut Saw, Band Saw Facility
f) Automatic Sanding
g) Mortise, Tenner Facility
h) Modern Edge Banding Facility
i) High Frequency Plank joining
j) Powered Small Toolsϖ Finishing Facilities
k) Laminating Facility
l) Quality Control Service
m) Skill Up gradation Facility
n) Marketing Network through optional Common
q) Branding

5. **Probable areas or districts where the products manufacturing or project can be established:-**

The following states are potentials to encourage the teak fabricated round blocks items in the future as per action target such as Nagaland in Dimapur district, Mokokchung , Noklak, Manipur in Chandal distict,Churachandpur, Kamjong Meghalaya in jaitia hills,Shillong Assam in Karbi Anglong district, North cachar , Tejpur . Arunachal Pradesh in Changlang district, Tirap, itanagar and west Bengal in 245 pargana, Kerala in cochin, kotayam, Jharkhand in Ranchi, Orissa, Karnataka etc

6. **Number of industries registered as MSME is available in the manufacturing of the product (Data division/ NIC Division of HQ):-**N/A
7. **Number of industries available in large scale industries (to be obtained from state Government):-**
   N/A
8. **Data about the Imports of this product for the past three year (Refer DC Office website):-**

India consumes over one half of all teak harvested globally; substantially more than other teak importing countries. Of the estimated global harvest of 2 – 2.5 million cubic metres, India harvests some 300 000 m3 domestically and, in 2012, imported almost 1 million m3 of round and squared logs (DGCIS, 2013) suggesting a total annual consumption of 1.3 million m3. Raiyani (2013) anticipates that this will increase to an annual 2.05 million m3 per year by 2020. Raiyani also sounds a voice of caution, warning that India has a teak estate of over 3.37 million ha with a standing volume of 371 million m3. Should the policies and the regulatory framework for Indian forests change, there is a possibility that domestic production from India's teak planting might increase

India's imports of teak round and squared logs:-

Both the volume and value of Indian import of round and squared logs have been increasing steadily since 2010 (Table 8) and these are expected to continue to grow at 5% (Raiyani, 2013). The value of rough teak imports has risen from US$320 million in 2010 to over US$528 million in 2012 (Table 1 & 2).

a):-**Teak wood imported by India Table -1**

2010		2011		2012	
USD	Quantity (m3)	USD	Quantity (m3)	USD	Quantity (m3)
319,316,669	647,746	470,629,047	934,268	528,525,501	996,943

Source: - DGCIS, 2013

b):-**Teak fabricated round blocks: Imported and Exported by India. Table-2**

2017-18		2018-19		2019-20	
Teak fabricated round blocks	Rs Crores	Teak fabricated round blocks	Rs Crores	Teak fabricated round blocks	Rs Crores
Import data	86.371904	Import data	94.221359	Import data	91.161052
Export data	2.293528	Export data	1.258389	Export data	1.495397

Source: - DGCIS, 2020

9. **Data available for the Exports well against this product for the past two years (Refer DC office website):-**
N/A

10. **Scope for the number of unit's number of years can be established further:-**
The following states are potentials to encourage the teak fabricated round blocks items in the future as per action target such as Nagaland in Dimapur district, Mokokchung , Noklak, Manipur in Chandal distict,Churachandpur, Kamjong Meghalaya in jaitia hills,Shillong Assam in Karbi Anglong district, North cachar , Tejpur . Arunachal Pradesh in Changlang district, Tirap, itanagar and west Bengal in 245 pargana, Kerala in cochin, kotayam, Jharkhand in Ranchi, Orissa, Karnataka etc

11 The demand in the domestic market: -

India is a land of wonderful and marvelous artistic work of wood. The rich handicraft and beautiful traditional attributes of art and design have established a reputation of Indian teak fabricated round blocks (Furniture) Industry in the nation and worldwide. The exceptional designs, rich, compact, and luxurious trends and, not the least, the supreme quality have given elegance to the furniture segment in the traditional as well as modern aspect. The fast emerging concept of standard lifestyle, interior designing, sense of comfort and architecture has given Furniture Industry an essential ever growing platform and thus empowering the industry to be termed as great manufacturers and exporters of grand quality furniture in terms of art, style, technology and beauty. And of course, globalization and media are also strong factors to give rise to the industry. The strongest factor for this upraise is the huge investment done by the foreign manufacturers and the credit definitely goes to versatile range of products by the industry. The Wooden Furniture Industry in India includes

a) Home Furniture – Living Room, Bed Room, Seating
b) Garden Furniture
c) Kitchen Furniture
d) Office Furniture
e) Upholstered Furniture
f) Contract Furniture¬

Market size – Rs 65000 crore currently.

a) Unorganized Sector plays most vital role – nearly 84% of the market
b) Annual Per Capita Use of furniture is less than INR 2000
c) Domestic Furniture contributes 65%, while Corporate/Office contributes 15%, Hotels 15% and ϖ others 5% of the total annual production.
d) Approximately 5100 manufacturing units exist in India
e) Total current employment is around 5, 20,000
f) TEAK contributes to about 50% of the raw material, 20% being SAL and DEODAR, balance being other types of woods including Pine, Oak, Cedar, Mahogany etc.
g) The richest 20% of Indian population consumes 47% of the total teak fabricated round blocks Wooden furniture production for interior design.

The processes used in the manufacturing of teak fabricated round blocks furniture are standard methods of receiving material, cutting & molding, component fabrication, assembly, finishing & packaging. The design of the article, for both aesthetic and functional qualities, is an important aspect of the production process. Some of the processes used in furniture manufacturing are similar to processes that are used in other segments of manufacturing. For example, cutting and assembly occurs in the production of wood trusses is the same as in general manufacturing of wood product. However, the multiple processes

distinguish wood furniture manufacturing from wood product manufacturing. Similarly, metal furniture manufacturing uses techniques that are also employed in the manufacturing of roll-formed products. The molding process for plastics furniture is similar to the molding of other plastics products. Furniture manufacturers use channels like Direct Sale, Wholesale, Retail

12. **The demand of the export market:-**

Exports have progressively increased while product lines and markets have diversified. India now exports timber products to an increasing number of developing and emerging economies. However, overall, the United States and the EU+EFTA markets continue to dominate, together accounting for more than 70 percent of India's timber product exports. The United States is by far the most significant market, consuming more than $1.2 billion in Indian-manufactured wooden furniture products between 2015 and 2019. Germany, France, the Netherlands, and the United Kingdom have each purchased more than $200 million in wooden furniture from India between 2015 and 2019. Belgium, Spain, Italy, Poland, and Denmark consumed slightly lower volumes during that time. A second tier of countries—China, the United Arab Emirates, Australia, Bhutan, Nepal, Canada, and Hong Kong—each accounted for between 2 and 4 percent of India's timber product export market. China, Nepal and Bhutan markets have grown 1,403 percent in the past 10 years, but from a very small base.

In 2019, the United States alone imported 40 percent of India's total timber product exports, a trade worth $449 million. Most (63 percent) of these exports to the United States were of wooden furniture. Other major timber product exports to the United States included other articles of wood (captured under HS code 4421 which also includes some wooden handicraft products), wooden frames for pictures, and marquetry – all of which have increased by export value since 2016.

Exports to EU+EFTA countries reached a new high in 2019, valued at $360 million, or 32 percent of India's timber product exports. Wood furniture, other articles of wood including some wooden handicraft products (HS code 4421), tableware and kitchenware, wooden tools, and marquetry dominate exports to the EU and EFTA.

In early 2020, the global market downturn due to the COVID-19 pandemic crushed India's export industry. Reported exports of all timber products fell 79 percent between January and May 2020, compared with the same five-month period in 2019. Exports of wooden furniture and handicraft products dropped 77 percent. Exports were down to all global markets.

TECHNICAL Details:-

1. **Sector in which the product is falling:**-ForestryProducts.

2**. End users of the products/sectors:-**

Teak has long been acknowledged for its excellent wood properties, making it one of the most sought-after multi-purpose timbers in the world. These properties, particularly for heartwood, include strength with lightness; durability; dimensional stability (due to a very low coefficient of expansion and contraction); non-corroding properties; ease of working and seasoning; termite, fungus, chemical, water and weather resistance and attractiveness (Keogh, 2009). The versatility of teak makes it suitability for a broad array of end-uses that are well documented - the best quality being used for high value furniture and boat decking and the smaller sizes used as a cheaper, utility timber. Specifically, where there is high humidity teak is ideal because it does not warp, twist or expand and its natural oils and resins (technoquinines) repel water and reduce insect or fungal attack. The dominant uses are in the furniture, doors and windows sectors (Somaiya, 2013).

The world's top producers of furniture are China, USA, Italy, Germany, India, Japan, France and Poland whilst the world's top exporters are China, Germany, Italy, Poland, USA and Vietnam. China remains both the world's largest producer and exporter (CSIL, 2013).

The furniture industry has expanded along with the recovery and expansion of the global economy since the financial crises of 2008. In 2012, global furniture production continued to recover and was valued at $370 billion in 2011 and by 2015, the global furniture market is expected to reach $436.5 billion. The value of global furniture trade in 2011 was $109 billion.

The United States is the largest furniture-importing country, with imports valued at $12.4 billion in 2011 (United Nations, 2012). There is a strong relationship between housing and furniture: housing has been a leading indicator of economic recovery; a house purchase being a discretionary expenditure and sensitive to interest rates. Lower interest rates are usually effective in stimulating demand for new houses. When people buy new houses they also tend to buy new furniture and other objects for their house. Wood furniture is a sub-set of the broader international trade in furniture and production/export patterns generally follow the broader furniture pattern. The largest importers of Teak wooden furniture are the markets in Europe and North America both of which are becoming increasingly sensitive to the needs of legality and certification in wood trade.

3. **Governing Indian specification:-**

BIS is the National Standard Body of India established under the BIS Act 2016 for the harmonious development of the activities of standardization. The Product Certification Schemes of BIS aims at providing Third Party assurance of quality, safety and reliability of products to the customer.

The Erstwhile Indian Standards Institution (ISI) Was Established In Year 1947 (Now Bureau Of Indian Standards) With The Objective Of Harmonious Development Of Standardization The Product Certification Schemes of BIS aims at providing Third Party assurance of quality, safety and reliability of products to the customer.
The Product Certification Schemes of BIS aims at providing Third Party assurance of quality, safety and reliability of products to the customer. Bureau of Indian Standards has been operating Management Systems Certification Scheme since 1991.Initially, BIS started the scheme with Quality Management System Certification.

4. **Governing International specification:-**

The report "State of the World's Forest Genetic Resources" published by FAO in 2014 lists tree species that are considered national priorities by the reporting countries
for the conservation and management of forest genetic resources. Teak (*Tectona grandis*) takes the top rank in this list in more than 20 countries. Economic value (including value of timber, pulp, food, wood energy, and non-wood forest products) is one of the main reasons for nominating the species as a priority for conservation andmanagement.

The international partners IUFRO, FAO, and TEAKNET acknowledge this priority and promote the initiation of a large-scale international research, developmentand cooperation program. Its goal is to strengthen the conservation and sustainable use of teak genetic resources for the benefit of teak growers, the forest industries,
investors and local communities in different country contexts in Africa, Asia/Oceania and Latin America.

The following summary and policy recommendations have been developed and formulated on the occasion of a group meeting of 12 experts1 from 11 countries that was organised and held by IUFRO and FAO in Vienna, Austria, in December 2016.

International regulations, legality and certification:-

The global wood markets have become increasingly sensitive to timber sourced illegally orunsustainably, with consumer companies applying voluntary verification (sustainability) standardsand/or governments introducing involuntary regulatory (legality) compliance systems that influencemarket access and acceptance.

There is now increased focus within trade and aid policies to encourage developing countries toadopt higher levels of sustainability in forest management approaches and reduce incidences ofillegal trade in forest products. It is now apparent that the major change occurring withininternational markets is that a demonstration of sustainability is no longer a primary requirement toaccess markets; management and governance systems must now demonstrate a commitment tolegality of product and transparency of supply.

The large markets of North America and Europe have responded legislatively, building on theprinciples of certification and associated sustainability and environmentally responsible production.

The Global situation: -

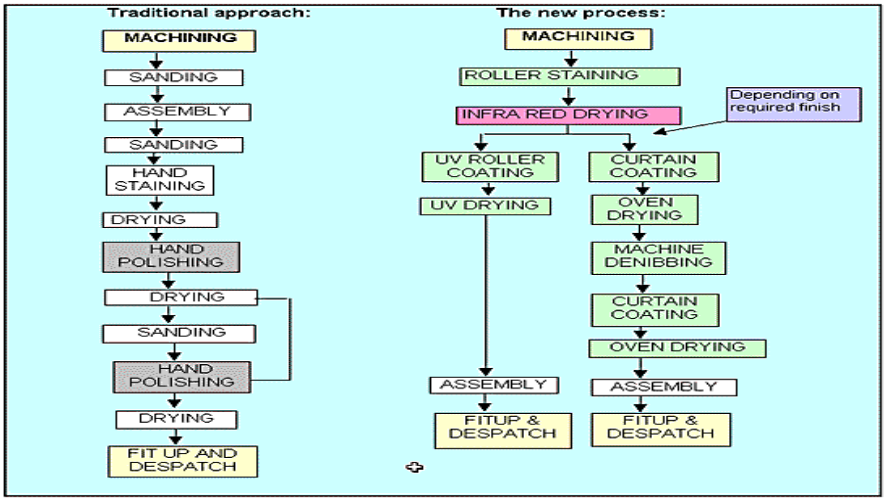
Natural teak forests, in particular old-growth high-qualitystands are declining. Likewise the sustained productionof teak logs from natural forests is decreasing due to overexploitationof existing stands, deforestation, conversion to other land-uses, and growing demand for environmental services from forests.

Nevertheless, teak is one of the few emerging valuable hardwood species that has been grown increasingly in planted forests in about 70 tropical countries throughout tropical Asia, Africa, Latin America and Oceania.

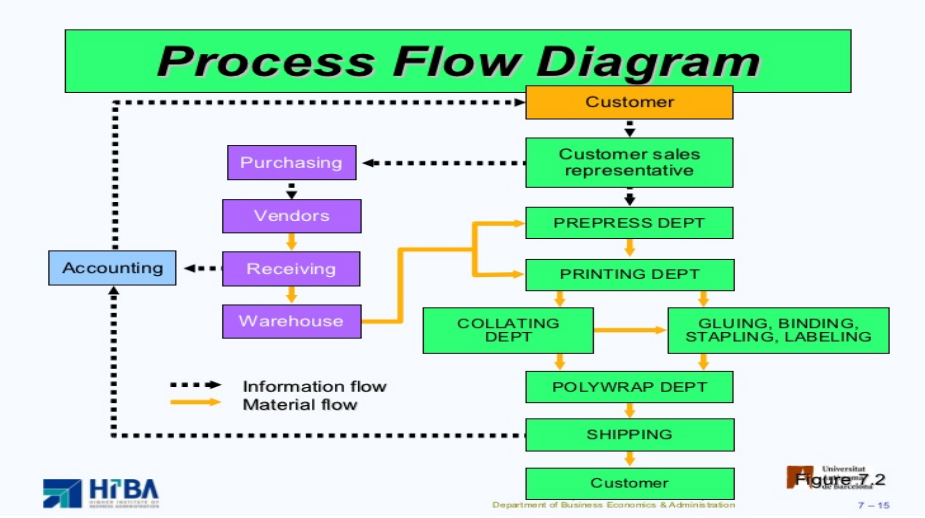
For most of these countries, albeit being an introduced species, teak represents a good opportunity to produce quality timber and is a major asset for the forestry economy attracting large investments from the private sector. Planted teak forests according to various estimates cover between 4.35 to 6.89 million ha.

They are known to exhibit a wide range of origin-related variation in growth and wood characteristics. Breeding programs continue to be developed in many countries aiming at improving timber quality of teak planted forests. Most of them, however, are established with seeds of uncertain origin and quality and more recently with clones being produced in countries such as Brazil, Costa Rica, Cote d'Ivoire, India, Indonesia, Malaysia, Tanzania or Thailand.

5. **Flow process chart of the teak fabricated round Unit Manufacturing:-**



a)



b)

6. **Qualitative parameters of the Product:-**

The global teak plantation resource of 6.8M ha is geographically spread across the seasonally drytropics and is mostly less than 20 years of age. As a popular plantation species, new plantationscontinue to be established and the area planted to teak is expanding. Although the annual woodincrement of global plantations is currently about 30M m3, only 2.0 – 2.5 M m3 are harvestedannually and this can be expected to increase as the resource matures. Industry sources suggest thatthe mature plantation resources of West Africa are likely to decline as plantations have not beenreplaced and that the plantations of Central and South America are reaching maturity and supply from this region will continue to expand. In addition, some of India's 2.5 M ha of plantations,previously unavailable for commercial utilisation, may be made available to meet India's domesticdemand if Government of India policies change.
An analysis of data available to this study indicates that some 1.3M m3 teak logs and sawn wood are currently being traded annually; a global trade worth an estimated US$723 million. The data demonstrates the importance of domestic processing which accounts for the remaining 1.2M m3 of harvested wood which is processed in the country of origin. The data firmly suggest that global trade is expanding and grew by 47% by volume and 58% by value between 2010 – 2012. "Burmese teak" sets international standards for quality and Myanmar is the world's largest supplier of teak logs and sawn wood, with exports growing by 50% between 2010 and 2012 and valued at $409 million in 2012. However, any future analysis of teak availability in global markets must account for a dramatic

reduction in teak supply from Myanmar following implementation of its proposed log export bans and forest trade reforms scheduled to commence in April, 2014.

The global resource and trade in teak:-

Importers of teak:-

There are four major importers of teak; India, Thailand, China and Vietnam. Of these, India andThailand have protected resources of native teak and both are growers of plantation teak andexporters of teak products.

India is the world's largest market for plantation teak, representing some 75% of global trade. India'simports are expanding and have grown by 54% since 2010 with a marked increase in trade withCentral/South America accounting for a large part of this increase. The increase in demand has beenfuelled domestically by an expansion in the real estate market and a boom in construction ofresidential housing where teak is the preferred timber, particularly for doors and windows whichaccount for some 40% of teak processed. Indian wooden furniture manufacture for domesticconsumption and export is growing steadily with exports reaching $592 million in 2012.

This sector issignificant user of teak. An Indian policy response to the proposed log export ban from Myanmar may be to allow greater access to Government-managed teak plantations in India. Whilst having animpact upon Indian domestic supply, this is not expected to have a large impact upon trade fromcountries other than Myanmar.

India's import preference is for round or squared logs (rather than sawn wood) which takesadvantage of India's low costs of processing and attractively low tariffs for round logs and squared Whilst India remains the leading global importer of teak round logs and squared logs, China a strong demand for sawn timber.

Although China is the world's largest importer of wood and exporter of wooden furniture (US$17.5billion in 2012), imports of teak logs to China are only 10% of those imported by India. Chineseimports of teak logs and sawn timber are expanding. In contrast to India where teak is used forbuildings and doors/windows, in China the use of teak is dominated by manufacture of woodfurniture for exports. Chinese processors of export furniture are becoming increasingly sensitive tothe need to demonstrate use of legally-sourced wood.

Thailand is a grower of native and plantation teak and both an importer of teak logs and sawn woodand an exporter of finished and semi-finished teak products. The country has mature, sophisticatedwood processing industries which have a heavy reliance upon Myanmar, particularly for supply ofhigh quality teak from native forests. As in China and India, the proposed log export ban and policyreforms in Myanmar are likely to have a very large impact upon wood supply and industry output.This may result in an increase in illegally sourced high quality timber from neighbouring countries ora shift to utilisation of plantation grown timbers from both domestic and imported sources.

Vietnam has a vibrant, sophisticated and modern, export-oriented wood furniture industry which isdependent upon imported logs and timber. Despite the size of the industry, there has been areduction in imports of teak logs and sawn timber. A possible explanation shared by processors hasbeen the challenges experienced in obtaining legally certified supplies of teak to service industrydemand. In contrast, supplies of competing plantation grown acacia and rubber have been in readysupply.

Influences in the global teak trade:-

There are a wide range of factors which influence global trade of teak, apart from the normalchallenges of international trade such as exchange rates, changing trade policies and regulatoryrequirements, taxes and tariffs.

The global trade is teak is frustrated by a lack of standards and consistency in establishing prices forteak logs. Despite a considerable international dialogue, the lack of standards, lack of informationand misinformation results in widespread uncertainty and confusion around teak investments,particularly in relation to prices. There is a rationale for provision of standard, transparent, up-to-dateinformation on plantation teak prices.

A potential source of misunderstanding in the teak trade is the confusion between methods ofcalculating log volume. Some producer countries one method for calculating log volumes anddimensions (e.g. Brereton) and a purchasing country (India) may use Hoppus as their standard.

Theentire industry supply chain in India is based upon Hoppus measurement and growers and suppliers who see engagement with the Indian market must be equipped with reliable standards andconversion factors to move between the two systems

Global wood markets are becoming increasingly sensitive to timber sourced illegally or unsustainablyand the large markets of North America and Europe have responded legislatively through specifyingprescriptive compliance measures. Confidential discussions with wood processors and wood productexporters in China, Vietnam, Lao PDR and Thailand indicate that importers have a strong preferencefor imported wood which is clearly legal and, in some cases, certified.

The ongoing competitiveness of the large Vietnamese wood furniture sector will depend upon compliance with legality requirements. Much of the export furniture market from Thailand and India are based upon teak and are heavily dependent upon the discerning markets of Europe and North America. This is achallenge which growers and processors of teak will need to address as a matter of urgency.Indonesia has completed domestic regulations to comply with a VPA with the EU and Vietnam is tofollow suit. Although designed for the EU markets, the conditions of a functioning VPA will meet therequirements for export to the USA

Opportunities and challenges for Lao teak in global markets:-

The Lao plantation teak resource of 40 000 ha is located largely in the north, small and highlyfragmented and almost entirely aged less than 20 years. As transport infrastructure improves andthe resource matures, its proximity to major global markets of Thailand, China and Vietnam (and to alesser account, India), will make it attractive for these markets. There have been reports (supportedby Indian import data) that consignments of
Lao teak squared logs to Thailand have been shipped toIndia. The burgeoning Indian industry offers possibilities to the Lao growers.

The global furniture markets are very competitive and furniture manufacturers are extremely price sensitive.
Small-sized teak from Lao PDR must compete with other tropical hardwoods such as acaciaand rubber wood and commonly traded temperate hardwoods. The teak available from Lao PDR isnot differentiated from other small-sized plantation teak available from other sources in Asia,Central America and Africa and will have to compete to establish and maintain market share. Tocompete in the international markets, those trading in Lao teak will need to differentiate Lao teak ina positive way through:

- Price and quality (including efficient logistics)
- Selling in standardised form as round or squared logs and in standard sawnwood dimensions required

by the markets

- Efficiency and ease of doing business through a sympathetic legal and regulatoryenvironment
- Clear GoL processes to establish legality to meet EUTR and Lacey Actrequirements
- Reliability and capacity of growers to assemble commercial consignments
- Responsiveness to the needs of buyers

The fragmentations of the resource across many thousands of smallholders make it challenging toassemble consignments of commercial size which meet market requirements of legality. Given thepoverty which characterises many of the teak growing communities in Lao PDR, it is likely thatconsignments will continue to be of small sized timbers as growers seek early financial returnsthrough early harvest. Recognising both of these issues, the GoL has encouraged the establishmentof growers' groups and adoption of processes to demonstrate legality and an informal dialogue hascommenced with EU partners regarding a VPA.There is an urgent need to complete an inventory of teak plantings in Lao PDR as the basis forplanning efficient marketing programs. Once industry has basic information on location and agestructure, commercial decisions can be made, consolidation can begin and contact made withreliable markets.

Traders provide a vital link between Lao PDR and the global markets and assume much of the riskentailed in making successful international trades. Locally, they will play a vital role in organisingcollection from smallholders to offer a consistent supply of quantity and quality to buyers. Thoseinvolved in the development of the Lao teak trade may care to moderate an obvious prejudice onthe part of some against traders and middlemen; they are a necessary part of the value chain.If Lao PDR continues to encourage Chain of Custody for its forest industry and Group Certification forits smallholder teak resource , and commits resources to gaining certification for its teak resourcesand processing facilities, then it is logical that marketing efforts be strengthened in countries whichhave a need for certified timber. For example, although India represents 75% of global markets, itsdominant domestic market is not sensitive to the additional costs of certification. Vietnam, however,has a world class wood furniture industry which is 90% directed towards exports; these exportsprimarily to the markets of the EU and USA. Similarly, the Chinese and Thai furniture industries areexport-oriented and have an obvious interest in both legality and certification. Certification will offeruncertain rewards unless reliable and regular buyers are located in these countries with acommitment to certification and legality.

It is important that the costs and benefits of verificationand certification programs are assessed fully to ensure that they are cost-effective for the growers.The Lao resource of planted teak, a high value, smallholder-grown, tropical hardwood, clearly offersattractive investment possibilities for local processing rather than export as low-value 'squared' logsto other countries. Knowledge of international markets will offer Lao growers and processors anopportunity to achieve efficiencies and refinements such as focussed marketing, assured legality andan improved regulatory environment and make appropriate adjustments to the supply chain tosuccessfully compete in markets for planted teak

Logistics and trade

The fragmented nature of the global teak estate across continents, countries and landholdings offers logistical challenges to the efficient sale of teak grown in plantations. Trades of teak logs may beshipped as break bulk cargoes, in containers or, where conditions permit, by truck. The commercialattractiveness of a planted teak resource is strongly influenced by the proximity to a suitable port,adequate road transport and infrastructure and sympathetic government regulations and servicesrelated to export procedures (such as tax, customs and quarantine clearance). Internationalshipments of teak require an understanding of concepts of global shipping includingcontainerisation, intermodal transport, non-vessel operating carriers and freight forwarders

Containers:-

Standard 20- and 40-foot shipping containers are becoming an increasingly common part of shippingfor teak consignments. They offer efficiency for loading and unloading and transfer of cargo to otherforms of transportation such as rail or truck plus a faster and more reliable delivery and logs arrive inbetter condition (Somaiya, 2013).

However, containers do have limitations and cargoes are limitedby dimensions and maximum weight limits (Table 2). Typically, a 20' container (TEU) can hold up to15m3 of teak logs up to 5.8 metre length (13m3 Hoppus) or up to 19 m3 of sawn timber or squaredlogs (up to a maximum weight of 22 tonnes). A 40' container (FEU) can hold about 22 m3 logs,generally cut to 3.9 metre lengths or sawn timber up to a maximum weight of 26 tonnes.
In addition to the costs of ocean freight, containerised shipments need to meet charges for BAF(Bunker Adjustment Factor), ICS (International Carrier Surcharge) and port charges such as MSA(Maritime Service Authority), TDC (Terminal Destination Charge) and a series of agents' fees.Shipping costs for consignments of teak round and squared logs in 20' containers between theSolomon Islands and ports in China, Vietnam and India are of the order US$84 – 112/m3 and aBreak-down of these costs is offered in Table 2:-**Standard dimensions of shipping containers**:-

Container size	Inside length (m)	Inside width (m)	Inside height (m)	Door width (m)	Door height (m)	Capacity (m3)	Tare weight (kg)	Maximum cargo (kg)
Standard 20'	5.89	2.33	2.38	2.33	2.28	33	2230	21700
Standard 40'	12.01	2.33	2.38	2.33	2.28	68	3701	26780

Teak wood prices are generally determined based on subjective (generally experienced) visual assessment of logs. There are no commonly accepted, systematic or consistent international grading rules with corresponding price values. An example of the many factors considered for calculating values of plantation-grown teak logs are combined in a draft set of Log Grading Rules established for the Solomon Islands (Appendix 1) (Laity and Ahsan, 2012).

7. Details of the Product Licenses to obtain:-

1.) DIRECTORATE GENERAL OF FOREIGN TRADE (DGFT)
Udyog Bhawan, H-Wing, Gate No. 2 Maulana Azad Road-110011, New Delhi, India,
https://dgft.gov.in/

Forest governance:-
In India the national (central) and state governments are jointly responsible for the sustainable management of the forest resources. In a practical sense, the state forest departments have a double role: they act as the custodians of the public forest resources and in capacity of forest authorities manage the forest resources on the basis of forest management plans (known as Working Plans).

Often the state forest departments also perform a commercial function, becoming involved in production, processing and trade through Forest Development Corporations (FDCs) which have been set up for marketing the forest products.

International timber trade is regulated by the Export Import (EXIM) policy of India, which is a five-year policy directive under the central government's Foreign Trade (Development and Regulation) Act 1992 (FTDR). The Authority under the FTDR act is the Director General of Foreign Trade (DGFT) under the Ministry of Commerce.

The most relevant ministries and agencies for forest governance are:

Ministry of Environment, Forest and Climate Change (MoEF&CC): Nodal agency in India for the planning, promotion, coordination and overseeing the implementation of India's environmental and forestry policies and programmes.

Ministry of Agriculture Cooperation and Farmers Welfare: Apex agency for formulation and administration of rules, regulations, laws, etc. dealing with matters affecting the improvement and development of agriculture resources (including agro-forestry) in the country.

Department of Commerce, Ministry of Commerce and Industry: A government body for formulating, implementing and monitoring the Forest Trade Policy (FTP) which provides basic framework of policy and strategy to be followed for promoting exports and trade.

Department of Land Resources, Ministry of Rural Development: A government body for formulating an efficient land use policy, transparent Land Records Management System (LRMS).

Ministry of Tribal Affairs: This central ministry is responsible for implementing Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006, which is a landmark law related to recognition of forest related tenurial and usage rights of traditional communities dependent on forests.
State Forest Departments (SFDs): The SFDs are the custodians of the state forests and responsible for its management and protection, including wildlife.

State Forest Development Corporations: Legally registered entities under the Companies Act of India, or any such similar Act, with a mandate to work on commercial aspects of forests, raising industrial plantations of species of commercial importance such as teak and eucalyptus, enhancement of forest productivity, restoration of productivity of degraded forest areas, harvesting and trade to timber and non-timber forest products (NTFPs), facilitating establishment of forest based industries, providing support to farmers for production and marketing of the forest produce and to provide consultancy in raising bio-aesthetic plantations. The functioning of these corporations differs from state to state.

Village Panchayat: A gram panchayat (village council) is the grassroots-level formalised local self-governance system in India at the village or small-town level and has a 'sarpanch' as its elected head.

Wildlife Crime Control Bureau: Statutory multi-disciplinary body established by the functioning under the MoEF&CC, to combat organized wildlife crime in the country. It also assists and advises the customs authorities in inspection of the consignments of endangered flora & fauna as per the provisions of Wildlife (Protection) Act of 1972, CITES and EXIM Policy governing such an item.

National Green Tribunal: Established for effective and expeditious disposal of cases related to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to the environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues.

Supreme Court Monitoring Committee: A special committee formulated by the direction of judges on matters they feel need technical expertise and strict monitoring through legal action. They perform constitutional and administrative duties for the court.

Legal rights to harvest

Major sources of timber in India are:

Forest Development Corporations (FDCs): FDCs are state owned legally registered entities. The FDC harvest the forest areas through a long-term MoU with State Forest Department.

State Forest Divisions (SFD): A forest Division is a territorially well-defined administrative unit of the state forest departments and the government owned forests. The divisions manage the forests through approved Working Plans*. The commercial harvesting of the trees/forest products is generally entrusted to state FDCs.

Individual Tree Owners: Growing trees on farmlands has been an integral part of the traditional agriculture practices in India. The farm owners may be growing the trees as block plantations, windbreaks and shelterbelts or as bund/boundary planting.

Private Plantations: Timber may also be grown on private plantations by individuals/corporate entities either alone or as an intercrop. There are practices of cultivation of tree crops as intercrops in coffee and tea fields etc.

***Working Plans** - The Working Plan is a document that details the management of forests of a territorial division in all aspects such as forest protection and conservation, wildlife management and resource harvest etc. Each SFD maintains the forest as per the working plan approved by the Govt. Of India. The working plan is revised/updated periodically every 10 years.

The legal rights to harvesting follows different procedures for the forest area harvesting and private landowners/plantations harvesting. In the government owned forests, state forest department does the harvesting through FDCs or contractors (outsource) and issues harvest permits for the same. The harvesting is done in compliance or as per the permissible limits mentioned in the working plans (in compliance with existing laws)

Note: Green felling is banned in India. Only the dead and decaying, matured plants are removed from the forests. Such felling is prescribed in the working plan and forest department has the right for felling or harvesting activities.

The harvesting rights consider the following components:

1. Land tenure and use rights

The legality for the government land tenure is available through government notifications. The information related to that can be verified from the forest departments and depots. In some cases, the land and use right may be shared between different entities (department and locals) and the same is recorded in the form of declaration/Govt order and further included in the Management plan (e.g. unclassed forests).

The land ownership for the private areas can be verified through village panchayat head or revenue officer. The land tenure and use rights evidence is a necessity for obtaining the harvesting permits. In India, each state has its own separate laws relating to land usage rights and ownership of agricultural lands.

The concession rights of the private owned companies in the government owned forest lands has been discontinued, following FCA 1980 & supreme court orders on Godavarman vs Union of India case.

2. Management and harvesting planning

There are several national and state level policies; however, as the Constitution of India empowered Indian state governments to enact rules regulating various aspects of forest management, laws and rules differ from state to state. Different states have different restrictions on felling of wood/timber raised on private land, based upon area, intended use and species.

All forests are managed under the prescriptions of a Working Plan prepared for a period of 10 years, according to the National Working Plan Code (2014) on the basis of principles of sustainable forest management and recognized practices.

No forest management practices can be carried out in government forests without the approved Working Plan (as per supreme court) and no harvesting can be done in any forest area without an approved Working Plan. The harvest is carried out either by government forest department or corporation or contractors appointed by the department as per the working plan.

The National Working Plan Code defines the content of a Working Plan and the topics that should be covered, such as objectives, organizational structure, preparation of maps, monitoring and reporting, harvesting and exploitation up to compartment level. The MoEFCC is the authority that approves the Working Plan of a state forest department. The supreme court committee oversees the implementation of the working plan prescriptions.

Special attention is paid to forest dependent communities concerns. Joint Forest Management (JFM) is such a programme, wherein responsibilities, authority and usufructs are shared between the village community/ forest user group and the forest department. At present around 24.6 mha of forests are managed under JFM model in India. (Source: Joint Forest Management, ENVIS RP on Forestry and Forest Related Livelihoods)

No working plans are applicable/required for the private plantations for harvesting and maintenance.

3. Harvest permits

Government owned forests (Reserved Forests, Protected Forests etc): The process and criteria of issuing harvest permits is specified in respective state harvesting rules and the rules are applied by respective SFDs.

Private Plantations: Harvesting permission for defined or non-exempted species need a harvest permit granted by Government forest officers (Divisional Forest Officers or Deputy Conservators of Forests) or local elected representatives (panchayat) for common lands.

Taxes and fees

Under the IFA 1927 (Chapter VII), there are existing state harvesting and transit rules for collection of royalties for specified species. Harvesting rules are state specific. State Forest Department is the legal authority regarding collection of royalties and transit fees as specified in the regulations.

Mandi samities (local market committees) collect fees from farmers and private plantations for the species obtained from the agricultural land (through agro-forestry, farm forestry, etc.), as per State APMC Act (Agriculture Produce Market Committee).

Goods and Service Tax (GST) is an indirect tax levied in India on the supply of goods and services. GST is levied at every step in the production process, but is refunded to all parties in the chain of production other than the final consumer. GST is levied on all transactions such as sale, transfer, purchase, barter, lease, or import of goods and/or services. The Goods and Services Tax (Compensation To States) Act, 2017 can be found here.

GST is administered by both the Central and State Governments. Transactions made within a single state are levied with Central GST (CGST) by the Central Government and State GST (SGST) by the State governments. For inter-state transactions and imported goods or services, an Integrated GST (IGST) is levied by the Central Government. All businesses are assigned a unique number, Goods and Services Tax Identification Number (GSTIN). The GST rates can be found here.

Government forest: The income from timber sale from government forests is considered as government revenue and no income tax is levied on such revenue.

Private forest: Income Tax Act 1961, Section 1 to 10. Not applicable in case of farm products i.e. income from timber sales in an agroforestry system.

Timber harvesting activities

Government forest:
Timber is harvested from government managed forests as per rules and conditions laid out in NWPC 2014 as permitted by SFD authorities.

Private forest:
No legally binding harvesting code is applicable

EIA requirements: NA for forest activities

NWPC 2014 includes best practices for sustainable management of forests and biodiversity in India. However, it is not a legislation. The code is implemented as part of preparation, development, implementation and modifications in the Working Plan. Such activities are not applicable to private plantations.

Protected sites
The Wildlife (Protection) Act 1972, states that hunting or collecting wild animals and plants in areas protected by the State requires approval from the Forestry Administration. According to the NWPC, SFDs must implement a Management Plan for Protected areas and

a working plan/scheme, also adhering to the Forest (Conservation) Act of 1980, the Wildlife (Protection) Act of 1972.

Wildlife clearance from National Board for Wildlife (NBWL) and/or its Standing Committee has to be obtained if the harvesting area

falls within Protected Areas and is as per the management plan. Clearance has to be obtained from the Supreme Court of India, if harvesting areas are in the National Parks and Wildlife Sanctuaries. For some selected species, written permission in the form of a harvesting permit and transit pass are required for harvesting and transportation of designated species (even for private lands).

TIMBER OPERATIONS:

The State Government has issued a Notification as "Tree Felling Regulation, 2017" which will facilitate felling/ selling of timber by villagers, from Private Plantations under supervision of the Forest Department through Transit Permits. This regulation covers felling

of trees from non-forest areas including Tree Plantation in non-forest area.

Ban on export of round logs below 4 (four) feet in girth on the pretext of firewood or otherwise to any place outside the State continued.

Operation of Forest Produce other than timber, such as cane, agar, etc continued to be regulated by 'Mahal' system, on outright sale as per the provisions of Mahal settlement rules contained in the Nagaland Forest act, 1968. The system continued without any change.

Ban on issue of 'FREE PERMITS' on Timber continued in order to plug leakage of Government revenue.

e) On 12th December, 1996 the Hon'ble Supreme Court vide order No.597/95/PIL/WRIT in the matter of T.N. Godavarman Vs Union

of India & Others dated 17.12.1996, New Delhi has passed order banning the felling of trees including transportation of logs, veneers/ plywood and timbers, and has ordered the closure of all mills (saw/ veneer/plywood) with immediate effect. As per the direction of this order, the State Government/ Department had followed the Hon'ble Supreme court Orders accordingly. Pursuant to the Supreme Court Orders dated 04.03.1997, the Ministry of Environment & Forests, Government of India, New Delhi had constituted a High Power Committee (HPC). As per the instructions of the committee, inventories of timber and timber products in all forms lying in various parts of the State was prepared and taken into stock. The State Government vide No. FOR/GEN-1/97 dated 06.06.1997 has constituted a State Level Committee as well as the District Level Committee to verify and check the inventory of stocks of timber. Till now, the HPC had given the clearance for quite a number of mills in the state for operation and those mills cleared by the HPC have been given the final clearance by the Principal Chief Conservator of Forests, Nagaland, Kohima. In compliance with supreme Court order dated 15.1.1998, the State Government has constituted Committees for:

Pricing

Preparation of Working Plans ; andNotification of industrial estates.The High Powered Committee at the Centre is dissolved now.

WOOD BASED INDUSTRIES:

Any industry which processes wood as its raw material (Saw Mills/ Plywood/ Veneer/ Pulp or any other form such as sandal, katha wood etc). It does not include furniture unit.

Saw mill- means plants and machinery in a fixed structure or enclosure, for conversion of round logs into Sawn sizes.

Veneer Mill or Plywood Mill – means plants and machinery and the premises in which or in any part thereof, conversion into required size, slicing, peeling, fashioning or seasoning of timber/ wood, including preservation and treatment thereof either by mechanical or chemical process with the aid of electrical or mechanical power or manually is carried out.

Furniture unit – mean plants and machinery and the premises including the precincts thereof in which or in any part thereof wood based finished products are manufactured using sawn timber, cane, bamboo, seed, plywood or any other wood based product, except a round log, outsourced from licensed wood based industrial units or other legitimate sources and operating without a bond Saw or re-saw or Circular saw of metre than 30 cm diameter.

GUIDELINES FOR TRANSPORTATION OF MOLDED BEATS/FRAMES FROM NORTH EASTERN STATES:-

Pursuant to the Order No.8-15/SIT/2005/Pt.XVI dated 17.04.2006 of the Special Investigation Team (Constitute pursuant to the Hon'ble Supreme Court's Order dated 13.01.2000 in WP(C) No.202/95, fallowing guidelines are to be fallowed for transportation of molded beats/frames outside the State of Nagaland;

All molding beat /frames unit are required to obtain registration from the local DFO on payment of Rs 500/-(Rupees five hundred only) as registration fee through Treasury Challan Registration is to be renewed every year.

Molding beat/frame unit shall be located within an approved industrial estate.

It shall use sawn timber sourced from HPC Approved saw mills.

The input for the molding beat/frame shall be duly accounted for in the output of the sawn timber of the concerned HPC Approved saw mill and shall also be recorded in its monthly returns.

The round timber shall be felled as per approved Working Scheme/Tree Felling Regulation Act,2002.

The loading of molding beats/frames shall be done under strict supervision of the Forest Officers and shall be covered by valid transit passes including mill challans (conversion) from HPC cleared mills.

7. No transportation of moulding beats/frames shall be permitted outside the North East by road. Such transportation within the North East shall be permitted only if valid transit pass has been issued after verifying the legality of the timber and provided.

8. NETWORK FOR CERTIFICATION & CONSERVATION OF FORESTS (NCCF)
EPCH House, Pocket 6&7, Local Shopping Complex, Vasant Kunj, 110070
New Delhi, India, email: info@nccf.in, http://www.nccf.in/

9. MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE (MOEF&CC)
Indira Paryavaran Bhawan,Jorbagh Road 110003, New Delhi, India
http://moef.nic.in/index.php

10. DIRECTORATE GENERAL OF FOREIGN TRADE (DGFT)
Udyog Bhawan, H-Wing, Gate No. 2 Maulana Azad Road, 110011
New Delhi, India, https://dgft.gov.in/

a) Harvesting:-

Key document	Legal authority	Explanation
Working plan – according to requirements of the National Working Plan Code (NWPC)	MoEFCC	All forests are managed under the prescriptions of a working plan / scheme for the period of 10 years, and approved by the Ministry of Environment, Forest and Climate Change. No harvesting can be done in any forest area without an approved working plan.
Harvesting permit	State Forest Division (SFD) of the relevant state	Different states in the country have different restrictions on felling of timber, based upon area, intended use and species and is regulated by laws, rules and regulations prevalent in that state. Most state regulations distinguish species, and include minimum girth specifications.
Transit pass	State Forest Division (SFD) of the relevant state	Company responsible for extraction of timber from the forest also needs a transit pass. Some species are exempted from the transit pass.

b) Processing and trade

Key document	Legal authority	Explanation
Transit permit / transit pass	State Forest Division (SFD) of the relevant state	States are empowered to enact Transit rules regulating the movement of forest produce, including timber, within the state. NB: states have prescribed their own transit rules regulating movement of timber and it varies from state to state.
EXIM license		
Sales records – invoice		Prepared by the selling party and covering the specific batch.
Bill of lading		Prepared by the selling party and covering the specific batch.

8. **Equipment required for the Manufacturing of the Product:-**

(a)

(b)

(c)

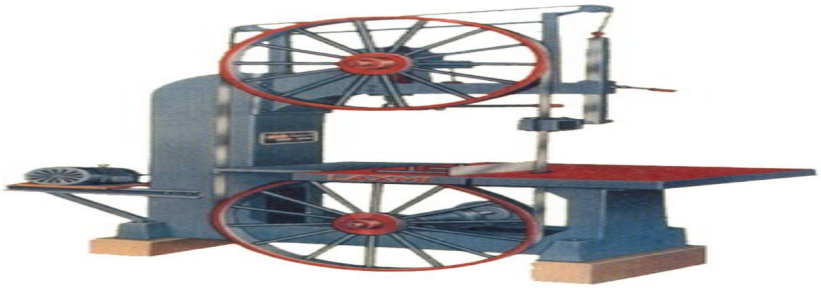
THM

(d)

1. Jai Manufacturing and Exporter, Gujarat,

Home
Jai
For now. Forever.

2.**Mini Wood Band Saw Machine**
₹ 1.3 Lakh/ Piece
Sold By - Shree Vaibhav Laxmi Industries, Gujarat



3.Send a quick message to the seller for more information.
Wood Cutting omkar Mini Horizontal Bandsaw Machine, Size/Dimension: Size 18"/24", Model Number/Name: Moih18"
₹ 2.85 Lakh/ Unit
Sold By - Omkar Industries, Gujarat
Write your message here

4. **Mini Wood Saw Mill**
₹ 65,000/ Unit
Sold By - Leader Machine Tools, Punjab
Enter required quantity to Get Best Price

9. **Test facilities required for the product:-**

a) Sri Rahul Gupta, BA - 15, Mangolpuri Industrial Area, Phase - 2
Mangolpuri S Block, New Delhi - 110034, India
https://www.indiamart.com/sgm-lab-solutions
Call 09811565000.

Product Description:-

a) Sigma Test & Research Centre provides testing services for Wood such as;

- Modulus of rupture:, Modulus of elasticity, Internal bond strength:
- Moisture content, Density, Bending strength, Compression strength:
- Wood-based panels, Absorbability, Swelling in thickness, Ability to hold a screw:
- Dimensions stability, Wood quality, Impact of a soft body, Resistance to indentation:
- Flush Door Shutter, Pre laminated particle board, MDF / MDP Board:
- FRP / GRP door shutter, Ply wood:

Sri Rahul Gupta

BA - 15, Mangolpuri Industrial Area, Phase - 2
Mangolpuri S Block
New Delhi - 110034, India
Get Directions

https://www.indiamart.com/sgm-lab-solutions

Call 09811565000

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Sigma Test & Research Centre provides testing services for Wood such as;

- Modulus of rupture:
- Modulus of elasticity:
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- Bending strength:
- Compression strength:
- Wood-based panels:
- Absorbability:
- Swelling in thickness:
- Ability to hold a screw:
- Dimensions stability:
- Wood quality:
- Impact of a soft body:
- Resistance to indentation:
- Flush Door Shutter:
- Pre laminated particle board:
- MDF / MDP Board:
- FRP / GRP door shutter:
- Ply wood:

M/S Sigma Test & Research Centre
Regd. Office: 99, Badli Industrial Area, Phase 2, New Delhi, Delhi 110042

Branch Office: No.26, “Shri” Complex, 2nd Floor, Bendre Nagar, Above “SBM” ATM, Subramanya Pura Main Road , Kadirenahalli, Bangalore-560070, India.

Product Description:-

We are rendering **Wood and Furniture Testing Service** to our patrons. Due to prompt completion, our offered service is extremely admired in the market. Our service meets on client’s demand. Moreover, we render this service as per patron’s demand.

Rajesh Kumar Roshan, D 14/8, Okhla Industrial Area, Phase 1
Okhla Industrial Area, New Delhi - 110020, India, https://www.indiamart.com/unique-india-lab
Call 08046067782

MDF Testing IS 12406
Sold By - Wood Certification Private Limited, Delhi

Wood Certification Private Limited
Karol Bagh, New Delhi

Jayanti Bhai, No.16, Dharti TenamentNikol
Ahmedabad - 382350, Gujarat, India, https://www.jklaboratory.com
Call 08048022441

Product Description: Wood Testing Services

General Parameters :

1	Modulus of rupture
2	Modulus of elasticity
3	Internal bond strength
4	Moisture content
5	Density
6	Bending strength
7	Compression strength
8	Wood-based panels
9	Absorbability
10	Swelling in thickness
11	Ability to hold a screw
12	Dimensions stability
13	Wood quality
14	Impact of a soft body
15	Resistance to indentation
16	Flush Door Shutter
17	Pre laminated particle board
18	MDF/MDP Board
19	FRP/GRP door shutter
20	Ply wood

Wood Testing Services

Sold By - Marg Test Lab & Engineering Services, Rajgarh, Madhya Pradesh.

Product Description
We are passionately engaged in supplying an exclusive range of **Wood Testing Services**. Offered testing service is executed as per the set standards using modern testing instruments & techniques. We interact with our customers for taking their needs before rendering the testing service. Customers can avail this testing service in a stipulated time frame at affordable price.

Teak Wood Testing Service
Sold By - Ace Test House, New Delhi

M/s Sigma Test & Research Centre, Regd. Office: 99, Badli Industrial Area, Phase 2,
New Delhi, Delhi 110042.
Branch Office: No.26, "Shri" Complex, 2nd Floor, Bendre Nagar, Above "SBM" ATM, Subramanya Pura Main Road, Kadirenahalli, Bangalore-560070, India.

Product Description
We are rendering **Wood and Furniture Testing Service** to our patrons. Due to prompt completion, our offered service is extremely admired in the market. Our service meets on client's demand. Moreover, we render this service as per patron's demand.

10. **The Technology existing the manufacturing of the product:-**

Introduction:-

Teak (*Tectona grandis*) is one of the world's premier hardwood timbers, rightly famous for its mellow color, fine grain and durability. It occurs naturally only in India, Myanmar, the Lao People's Democratic Republic and Thailand, and it is naturalized in Java, Indonesia, where it was probably introduced some 400 to 600 years ago .

Indonesia has a long history of growing teak as an exotic plantation. The species is believed to be introduced the first time in 14th century by Hindus (Simatupang 2001). Currently Indonesia is one of the world's largest teak grower. Most of the plantations have been grown in Java, where the largest grower is Perum Pehutani (state-owned forest corporation) which manages over 1 million ha of Teak-bearing plantation with a net area of Teak estimated to be around 6,00 000 ha. Community-grown Teak plantations have been becoming of importance in producing teak log, not only in Java, but also in eastern Indonesia such as South Sulawesi, South East Nusa Tenggara and East Nusa Tenggara. The trend of teak planting by farmers has been continuously increasing in recent years due to decreasing the log supply from state forest managed by Perhutani while the demand of teak-log is steadily increasing.

Teak log harvested from community-teak plantation has been stated to have low quality and consequently low price as well due to be harvested at much younger ages around 15-20 years compared with that of traditionally known of teak log from the state forest harvested at least at 40 years old. However, complete information on the productivity, log quality, wood properties and processing of teak log harvesting from community-grown Teak plantations in Indonesia is still lacking. The present study is intended to gather this information with a particular reference to Java and eastern Indonesia which have a large size of community Teak plantations.

The field surveys also collected information on a wide range of log dimensions and qualities at selling time harvested from short-rotation community Teak plantations. During field surveys interviews with teak growers and processors were also conducted. The technology and the business process followed by individual units of this five decades old cluster profusely depend on their traditional job knowledge and skills inherited from the ancestors. Most of the units are observing age old practices for operating their business.

The following Process Flow Chart depicts average process followed by the units in individual level. Process Flow Chart followed by the units in general Getting Order from Customers Planning/Procurement of Raw Material Seasoning and Treatment (as and when required) DESPATCH TO CUSTOMER.

Wood Processing:- In every area being surveyed there were teak wood processing units run by local people. They were typically small sized enterprises, traditional, and had low capital. Surprisingly there were many people involved in the teak log marketing and processing. Some were involved in marketing logs only, some were involved in marketing logs and processing, the others were involved in processing and marketing products. The small enterprises were generally initiated by the availability of opportunities, personal communication or family heritage. They have not been managed professionally.

Information gathered from the survey reveals that there were two types of enterprise working on teak wood. The first type is called teak log buyer. They are involved in buying trees from the community teak growers in the villages, collecting and putting logs in log yards and then selling the teak logs to wood processors. The teak buyer usually owns log yard for sorting and piling logs.
The second type is teak businessmen who are involved in teak log processing and/or producing end product of teak wood such as furniture, housing components and other ordered items. They have the wood processing site such as sawmill, drying facilities, and other processing machineries. Interviews were also carried out with the teak log buyers (first type of enterprise) to collect additional more information on log qualities.

Sawing technique:-


Figure -1 (a) **(b)**






Almost of the observed sawing techniques in the rural or community teak wood industries were traditional, and very simple.

The log was reduced to all lumbers of tangential type. The advantages of this sawing technique are very fast sawing, efficient, and no time required turning logs for specific dimension of sawn lumber. All products of processing these tangential lumbers are for making furniture. However, the technique could produce lumber prone to defect such as splitting, bowing, and cupping. Some community industries used band saw for breaking down the logs, the others employed large diameter of circle saw (Figure1). The first sawing type is more efficient in processing and producing high yield, while the second one produces lower yield due to high sawdust waste.
The data on the recovery rate of sawing is lacking. Most of the small sized processors did not assess the yield from sawing the log. Observations on the sawmill reveals that the recovery rate of most of the sawmill processing teak log form community plantation was low, below 40 %.

However, some industries, for example in Gunung Kidul have employed a relatively high technology of drying wood, which is so- called heating type by a wood heater (Figure 2 b and c). This drying technique is done by burning wood waste or lignocellulosic materials that is considered as waste in a box like burner and then the hot air is supplied to the drying chamber. The lumbers are stacked or piled in such a way that hot air could pass through the inter lumber space and could remove water from the lumber quite fast. This technique will shorten the drying time but if it is not done carefully would produce more percentage drying defects.

11. **Suggested Modern Technology for implementation or available in the Market:-**

a) **The need for wood processing improvement:-**

The current teak wood processing observed in the small sized industries is mostly considered traditional, less efficient and using simple and often traditional tools for wood processing. There are a wide range of opportunities to improve the current wood processing to achieve the high quality of teak wood products. The following areas in wood processing are suggested:

1. **The sawing technique.-**

The technique employed should consider the log quality and the price of sawn timber. This combination factor will generate high revenue of sawmilling. The current sawing technique is mainly tangential lumber type sawing. This sawing method does not consider the log quality or log defects along the stem. Consequently, the lumber quality and its yield are not predictable.

2. **Sawing machine.** -

The proper use of sawing machine and type of saw blade should be employed in the sawing system. By doing so the recovery rate can be increased significantly and the waste percentage can be minimized.

3. **Drying technique.-**

The proper drying technique should be introduced to the community wood industry. The setting up location of air drying with wood piling above the ground and covered by roof would minimize the effect of high humidity of soil and high humidity of air during night. Since wood is hygroscopic material, then it could attract moisture from the air and soil easily.

The current air drying conducted by rural people or community wood processors are merely vertical arrangementsof teak lumbers in rows in an open area without roof or only laying the lumbers in a declining position. The base lumber directly touches the soil. This technique of wood drying produces wide variabilities in the moisture content of wood and longer time to reach a certain moisture content. A relatively modern wood drying such as heating the wood piling to a certain temperature is an effort to reduce the drying time and smaller variations of the moisture content. This system seems to do well and requires small investment to build, but the drying defect is relatively high. Hot water drying system needs a bit high capital to set up the machine, however it will produce uniform moisture content and lesser drying defects.

4. **The improvement of color appearance of sapwood**.-

The light color of teak sapwood, which is whiter than the heartwood, should be reduced as much as possible for increasing the teak wood value. One of the known methods to make this sapwood portion does not appear is to change its color to the similar color of heartwood. This could be done by heating the wood. The heat treatment has shown a good promise to reduce the heterogeneity of wood color, meaning the color differences between heartwood and sapwood become less.

5. **More efficient use of Teak logs.-**

All teak logs procured from community teak plantations should be processed into useful products. This can be done by reconstituting the waste to become an acceptable dimension of wood products. A small dimension of log cut, log end, log with knots and end-splits, and other defects are glued together side by side to make lumber or beams. This lamination technique should be introduced to the small sized wood industry of the community.

6. **Product diversification**.-

Moving the conventional and commercial products of furniture to the high products of housing components such as beam, truss, window frames and other items will increase the revenue of the community teak wood processors.

12. **Raw Material required and availability:-**

Sl.no	Products	Raw Materials
1	Doors, Frames	Teak wood from private plantation, local wood like Terminaliamyriocarpa, Micheliadoltsopa, Gmelinaarborea
2	Windows, Frames and ventilators	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa, Gmelinaarborea, Duabangventilators asonnertioides
3	Dining set	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa.
4	Bed	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
5	Cup board	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
6	Stair rallying	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa.
7	Chest of Drawer	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
8	Almirah	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
9	Wardrobe	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
10	Shelf	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
11	Stands	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
12	Tables and Chairs	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
13	Chokut	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
14	Bench Type	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa
156	Epoxy River table	Teak wood from private plantation, local wood named Terminaliamyriocarpa, Micheliadoltsopa

13. **Covering Raw material standards Indian /International Standards:-**

The idea of India is gradually changing as number of countries showing interest to invest in India is increasing. According to an AT Kearney's FDI Confidence index, India has displaced the US as the second most favored destination in the world after China.

India attracted **FDI at US$7.96 billion** during the first half of FY06, as **against US$2.38 billion** during the same period in FY05, more than 3 times growth. India's economy is predicted to be growing over 8% in 2006 and with a billion plus population India has its wings of varied culture and business/industry scenario across the country.

At the backdrop of such characteristics prospective investors in any foreign countries will be interested to know 'Doing business in India in wine industry'. The study aimed at highlighting macro-economic indicators of the country with its risk analysis in terms of currency, non-collection of goods and non-payment. It also discusses obstacles that the prospective investors may face and appropriate marketing strategies that they should adopt to ensure smooth landing in the country which requires a good understanding of its geographies and associated culture and business environment, least but not the last the market dynamics.

Approach taken for this study was to collect information/data from various authentic sources like industry associations, trade agencies and respective ministries wherever applicable. As far as policy/regulations are concerned respective ministries' reports and guidelines have been referred and an attempt has been made to explain them appropriately as relevant they may be.

Salient points which are key findings in this report are given below. Challenges in the market is still to find the right partner, knowledgeable about local market and procedural issues for foreign industries investment in India and can formulate the right strategies with solid foundation for setting up manufacturing base as JVs as the FDI policy may stipulate in respective sectors Tariffs (although tariff structure has been reduced considerably since economic reforms but issues still remain in some specific sectors) and poor infrastructure still poses a serious challenge to FDI.

In addition, heavily bureaucratic investment processes, poor IPR enforcement, government inefficiency, and corruption have also discouraged foreign investors. Winning strategy overcoming the market entry barriers for setting up an establishment-

A solid regional plan analyzing the local market demand and economics that work out to be feasible in producing in India and xporting to other countries in the world leveraging conducive economic factors that otherwise become an impediment in future growth. While marketing products distribution strategy can really make the difference; however merit has to be given after due diligence is done and a meticulous plan should be in place.
Small distributors can really make a drastic improvement in sales growth where flexible marketing strategies play an important role.

A joint venture company is generally formed under the Indian Companies Act of 1956 and is jointly owned by an Indian company and a foreign company. This type of arrangement is quite common because India encourages foreign collaborations to facilitate capital investments, import of capital goods and transfer of technology. All industrial undertakings are exempt from obtaining an industrial license to manufacture, except for
(i) Industries reserved for the Public Sector,
(ii) Industries retained under compulsory licensing,
(iii) Items of manufacture reserved for the small scale sector and
(iv) if the proposal attracts location restriction.

Being a buyer's market from seller's market promotion of products matters much. The key to gaining rural market share is increased brand awareness, complemented by a wide distribution network. Rural markets are best covered by mass media - India's vast geographical expanse and poor infrastructure pose serious challenge for communication and hence emphasis must be given in communication problems to be really effective in selling to rural market.

India is still not holding its laws high for protecting copyright issues. As a result cases of counterfeiting and violation of copyright act happens and probably judicial system is still not being able to curb the menace. Adjudication of cases is extremely slow. Logistics play an important role in distributing products to all corners of the country. Due to its vast territory challenges in implementing a smooth supply chain model is really challenging and hence outsourcing to third parties is very common and an useful and effective strategy to reach market place just in time.

2.12 **Local against imported:-**

The major difference between imported products and the local products is that imported products have a better finish taking into consideration their use of modern technology and machinery. Also the products are stylish and ergonomically designed.

The quality of "up market" locally manufactured products is quite good but, at a cost. The quality of imported mass produced consumer durables are generally quite good however, the product life is quite short. There is a good demand for mass produced imported furniture as they could be purchased "off the shelf" and, could be used instantly. In comparison to prices the imported products cost more than the local product. Availability of the local product is good in comparison to the imported products however, recently this scenario is changing with furniture and lighting outlets multiplying in the mega cities and metros. Government does not allow FDI in single brand retailing for imported products in India whereas for the local products there are no such restrictions.
India's imports of sawn wood from countries with active sawn wood export restrictions (2010-2019) Source: UN Comtrade 2019, compiled by Forest Trends 2020:-

India is poised to join China and Vietnam as a furniture-manufacturing hub, importing vast amounts of timber from all over the world and processing this wood into finished products. India's wood-based industries— comprising both large companies and millions of artisans and small and medium enterprises—now export timber products valued at more than $1 billion,1 an increase of 138 percent by value since 2010.

At the same time, India's rural population continues to require vast amounts of fuel wood for heating and cooking, while the urban population is purchasing more furniture than ever before. Rising incomes and evolving tastes, such as an increased desire for "eco and nature-themed" design, mean that demand for wooden furniture and handicrafts is higher than ever. Where do all the raw materials to supply this wood products industry come from? Can Indian manufacturers guarantee that their products are legally sourced, let alone sustainable? Despite government efforts to raise domestic productivity, India's overall timber production remains low.

This is especially true for the tree species preferred by consumers such as teak, sheesham and pine. Demand for all forestry products surpassed the domestic supply in the mid-1990s and this gap is likely to have grown significantly since, particularly for high-value hardwood species (FAO 2007).

To meet this supply gap, Indian manufacturers have doubled their imports of raw materials in the past decade. Imports of raw materials will likely to continue to increase, as the Government of India considers incentives to boost the domestic furniture industry further, including through duty-free imports of raw materials and by banning furniture imports altogether following recent economic concerns resulting from the COVID-19 pandemic (The Economic Times 2020).

Unfortunately, many of the countries that now supply India with these raw materials suffer from high levels of illegal logging and associated trade. The International Union of Forest Research Organizations estimates that India was the third-largest importer of illegally logged timber in the world in 2016, after China and Vietnam (Kleinschmit et al. 2016).

While the government regulates the tax and phytosanitary regimes of the timber imports, as well as endangered species, India

has not instituted any robust regulation to exclude the import of wood products harvested and traded in violation of the laws and regulations in the source country. Certification systems that could verify legality and/or sustainability are also not used widely.

Without such systems, there is no guarantee that India's exports of manufactured timber products are verified as legal. Yet more than three-quarters of India's timber product exports require such verification by law in the importing nation– a figure that rises to 90 percent for furniture alone.

The United States and the European Union are India's largest markets for timber products. Both now have laws in place to restrict the import of illegal wood and forest products and require verification of legal harvest. Australia, Japan, the Republic of Korea and Indonesia also have similar laws in place, to be followed soon by Vietnam, and Thailand.

Buyers in all these markets risk fines, penalties and/or prosecution if they cannot comply. Indian suppliers risk losing these markets to other countries that can provide the legal assurances requested.

Export Demand

In 2019, India's total timber product exports were valued at $1.13 billion, an increase of 138 percent since 2010.12 Major export products included wooden furniture, other articles of wood, wooden seating, logs, and marquetry, according to official trade data reported by the Government of India to UN Comtrade (United Nations 2020.

Exports have progressively increased while product lines and markets have diversified. India now exports timber products to an increasing number of developing and emerging economies. However, overall, the United States and the EU+EFTA markets continue to dominate, together accounting for more than 70 percent of India's timber product exports.

The United States is by far the most significant market, consuming more than $1.2 billion in Indian-manufactured wooden furniture products between 2015 and 2019. Germany, France, the Netherlands, and the United Kingdom have each purchased more than $200 million in wooden furniture from India between 2015 and 2019. Belgium, Spain, Italy, Poland, and Denmark consumed slightly lower volumes during that time. A second tier of countries—China, the United Arab Emirates, Australia, Bhutan, Nepal, Canada, and Hong Kong—each accounted for between 2 and 4 percent of India's timber product export market. China, Nepal and Bhutan markets have grown 1,403 percent in the past 10 years, but from a very small base.

In 2019, the United States alone imported 40 percent of India's total timber product exports, a trade worth $449 million. Most (63 percent) of these exports to the United States were of wooden furniture. Other major timber product exports to the United States included other articles of wood (captured under HS code 4421 which also includes some wooden handicraft products), wooden frames for pictures, and marquetry – all of which have increased by export value since 2016.

Exports to EU+EFTA countries reached a new high in 2019, valued at $360 million, or 32 percent of India's timber product exports. Wood furniture, other articles of wood including some wooden handicraft products (HS code 4421), tableware and kitchenware, wooden tools, and marquetry dominate exports to the EU and EFTA.

In early 2020, the global market downturn due to the COVID-19 pandemic crushed India's export industry. Reported exports of all timber products fell 79 percent between January and May 2020, compared with the same five-month period in 2019. Exports of wooden furniture and handicraft products dropped 77 percent. Exports were down to all global markets.

2.0**Domestic Demand**

A variety of factors lie behind India's burgeoning domestic demand for timber products. While recent estimates on current demand for timber products remain limited, social and economic shifts in India suggest that demand is increasing and evolving (Box 1).

The most obvious factor is the country's remarkable economic growth. India has had considerable success in reducing poverty—lifting 271 million people out of poverty in just the 10 years between 2006 and 2016 (Alkire et al. 2020). Per capita income rose by almost 32 percent in 2017–2018 compared to 2012–2013 (MoEFCC 2018).As of 2016, roughly 121 million households in India belonged to the middle-income bracket, earning a gross annual income of between $7,700 and $15,400. This figure is expected to increase to 140 million households by 2025, thus making India's middle class significant relative to its total population (Keelery 2018). Dual income-earning households, larger disposable incomes, and changing lifestyle trends among Indian consumers are driving increased consumer spending, including for furniture considered to be "higher-end" (Sood 2019).

India's urban population is projected to grow to about 600 million by 2031 and 850 million by 2051 (MoEFCC 2018)

In addition, India's flourishing tourism and hospitality industry is reflecting evolving consumer preferences. A number of hotel chains are scaling up, even in smaller cities (Philip and Chaturvedi 2018). Increasingly, a large number of hotels are shifting away from décor and furnishings made from textiles such as carpets, turning instead to wooden flooring and the luxury spa atmosphere of natural "eco-furnishings" (Hotelier India 2015; Sood 2019).These factors have all contributed to a sharp increase in the domestic demand for commercial forest products.

At the same time, millions of Indians in rural areas still rely on fuel wood for heat and cooking – and much of the country's forest production objectives have prioritized wood for household use as opposed to industrial timber production. India has one of the highest rates of demand for fuel wood in the world, accounting for almost 90 percent of all India's forest product consumption (FAO 2007; Shrivastava and Saxena 2017; Sood 2019).

Annual fuel wood consumption was estimated at 332.95 million m3 in the 2011 India State of Forest Report (MoEF 2011), but this decreased by around 5.46 percent between 2011 and 2019 (MoEF 2019).

Recent data on demand for timber products other than fuel wood are limited. The best estimates for India's timber consumption excluding fuel wood are only available for housing, furniture and agriculture. Combined, these uses are estimated to consume 33.61 million m3 of timber. However, researchers suggest that this could be a gross underestimation, considering that most wood markets, especially the panel, plywood and furniture industries, are fairly unorganized, and no official estimates are available (Shrivastava and Saxena 2017).

The Government of India's 2009 review of the forestry sector predicted that demand would reach 152.80 million m3 round wood equivalent (RWE) by 2020, comprised of: Short-rotation species: 87.70 million m3 RWE for species such as acacia, bamboo, poplars, and eucalyptus. Long-rotation species: 65.10 million m3 RWE for species such as teak (Tectona grandis), gurjan (Dipterocarpus turbinatus), makai (Shorea assamica), dhup (Canarium spp.), pali (Palaquium ellipticum), and poon (Calophyllum inophyllum) (MoEF 2009).

The Indian domestic furniture market is expected to grow at an annual rate of 12.9 percent during the period between 2020 and 2024 (Tandon and Tewari 2019). Other reports value India's furniture market at $61.09 billion by the end of 2023 (Panels and Furniture Asia 2019). IKEA, for example, has announced plans to open more than 25 stores across the country, with investments of more than $1 billion in stores alone (Tandon and Tewari 2019).

With new construction and renovations evolving towards wooden "eco-furnishings" and floors, demand has increased for engineered wood panel products such as plywood, particleboard, medium-density fibreboard (MDF), and oriented-strand board and laminated veneer lumber for construction and infrastructure projects as well as flooring products.

Consumer Concern Grows Over Climate Change and Unsustainable Consumption:-

Indian citizens are increasingly concerned about environmental issues and are becoming more aware of the role that industry can play in mitigating climate change and conserving the environment. A Tetra Pak Index study in 2019 in India showed that 71 percent of respondents believed that the world is heading towards an environmental disaster unless people change their daily habits (Tetra Pak 2019). Further studies released in 2019 show that 89 percent of Indian respondents believe that companies need to do more to address climate change, and that these businesses should be increasingly accountable for both their products and their corporate behavior (Mahindra Group 2019). Accenture's 2019 Global Consumer Pulse survey showed that 82 percent of Indian respondents prefer buying from companies that reflect their personal values (Tewari 2019). This suggests a potential shift in future consumer purchasing preferences towards companies with demonstrable ethical, legal, and sustainable sourcing practices.

India's Timber Supply: Domestic Production and Imports:-

In the 1980s, the Indian government began to rethink its previous forest sector policies, which had been focused primarily on timber production (Vanam 2019). Faced with significant forest loss and degradation, principles of conservation and sustainable forest management began to be integrated into new policies and programs. Timber production from government forest areas fell dramatically in the mid-1990s. This exacerbated the increasing gap between domestic production and overall demand (Indian consumers plus export markets), creating a need for increased imports to meet this demand. Despite increased imports, the supply-and-demand gap continued to grow. In the 2000s, the government recognized the need to balance the multiple objectives of increased production and supply of wood for subsistence fuel wood with a growing timber-processing industry which could employ thousands of people, while at the same time deliver high-level forest cover, biodiversity and climate commitments. Simultaneously, the approach of increasing timber production from trees outside forests (TOF) to meet domestic demand also gained importance. Reports suggest that domestically produced wood and bamboo contribute roughly 75 percent of India's total available annual supply (Shrivastava and Saxena 2017). Yet, with demand from both domestic and foreign consumers continuing to rise, and the government's desire to meet its forest restoration and conservation goals, India will likely increase its reliance on imports in years to come (Gopikrishna Warrier 2018)

3.1 Domestic Production:-

3.1.1. Policies and measures:-

The Government of India has promoted the conservation and restoration of forests and has offered incentives to increase timber production from areas outside the designated forest area. On conservation and restoration, the government passed the Forest (Conservation) Act in 1980, which reportedly slowed down the rate of conversion of forest land into non-forest purposes (MoEFCC 2018). This rate declined from 0.165 million hectares per annum (1951–1976) to 0.032 million hectares per annum (1980–2016). In 1999, the National Forestry Action Programme (NFAP) was developed to rehabilitate and increase the productivity of degraded forests, and also to increase the area under forest and tree cover, to ensure that 33 percent of the country is forested. The National A forestation Programme, launched in 2000, is expected to contribute between 15 and 20 percent of the overall a forestation effort with an emphasis on improving the quality and productivity of the existing forest cover (Lal 2000). The government launched various programs to rehabilitate degraded lands and watersheds. India has also complemented the reforestation policies by re-allocating tax revenues to

states at least partially based on forest cover with the intention of incentivizing local governments to prioritize the reforestation of degraded land (Busch et al. 2019).

In 2015, the Government of India submitted its (Intended) Nationally Determined Contributions ((I)NDC) under the Paris Agreement, with a target of reducing overall emission intensity of its gross domestic product (GDP) by between 33 and 35 percent from 2005 levels by 2030 (UNFCC 2015). India ratified the Paris Agreement in 2016 with the NDC aiming "to create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030". This forest sector commitment is further detailed in India's Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategy published in 2018 which references the role of unplanned illegal logging and uncontrolled felling in driving deforestation, but which falls short of laying out policies to combat these drivers. Further strategies are forthcoming.

At the same time, the government has also sought to increase productivity of trees outside of forest. The National Forest Policy 1988 stated that "as far as possible, a forest based industry should raise the raw material need for meeting its own requirements, preferably by establishment of a direct relationship between the factory and the individuals who can grow the raw material by supporting the individuals with inputs including credit, constant technical advice, and finally harvesting and transport services". To minimize the pressure on India's forests and to meet industry's timber needs, the policy recommended import liberalization of timber and prohibited the export of unprocessed logs (Vanam 2019).
A commission on forests set up by the government recommended in 2006 that restrictions on felling on private land should be eased and should remain limited to "highly restricted tree species". Land ownership restrictions were lifted for plantations to encourage investment in larger agro forestry plantations. A report prepared by the Indian Institute of Forest Management (IIFM) as input to a Draft National Forest Policy in 2016 called for the need to "double the tree cover outside forests by the end of the next decade by incentivizing agro-forestry and farm forestry, facilitating assured returns with enabling regulations, and by promoting the use of wood products" (IIFM 2016). This report also recognized the need to encourage forest certification in India. The focus on "promoting sustainable use of wood" rather than "substitution of wood" has been lauded as a clear shift in approach (Vanam 2019).

3.1.2 Forest and forestland, and sources of production:-

India reported a 0.37 percent forest area annual net change rate in the FAO Forest Resource Assessment (FRA) 2020 (FAO 2020). A national increase of 3,976 km2 in planted forest has been reported between national assessments conducted for the India State of Forest Report (ISFR) in 2017 and 2019 (MoEFCC 2019).

States showing the most significant gains in forest cover are Karnataka, Andhra Pradesh, Kerala, and Jammu and Kashmir due to their conservation measures and forestation activities as well as local participation in protecting and managing planted and traditional forest areas (Sood 2019).

Manipur, Arunachal Pradesh and Mizoram states lost the most forest cover (MoEFCC 2019), reportedly due to shifting cultivation, biotic pressures (insects and diseases), rotational felling, diversion of forestlands for developmental activities, submergence of forest cover, agriculture expansion, and natural disasters (Sood 2019).

India's 72.16 million ha of forest cover is divided between 58.89 million ha of naturally regenerating forestland 13.27 million ha of planted forest (FAO 2020). Plantation extent13 was estimated at 10.04million ha in 2020.

In India, the natural forests are mostly state-owned and managed (NEPCon 2017a). While some state-managed plantation production is recorded from natural forest areas (Table 1), a significant volume of domestically produced wood and timber is sourced from trees outside the recorded forest area, mainly in the form of agro forestry plantations on private lands (Sood 2019). Wood production from these areas has been estimated at almost 14 times the production from recorded forest areas (Shrivastava and Saxena 2017).

The extent of trees outside the recorded forest area was estimated for the first time in 2019 at 29.38 million ha (MoEFCC 2019). This includes trees from agricultural land (often species such as mango), farm forestry areas (often species such as eucalyptus, acacia, poplar, casuarina), social forestry areas which include roadside areas, as well as land around educational institutions, factories, railways, gardens, community lands and private lands such as estates. As such, government-owned and -managed forests, including state forest plantations, provide only a small portion of the total domestic timber supply.

The total growing stock of wood in India is estimated at 5.91 billion m3 comprising 4.27 billion m3 inside forest areas and 1.62 billion m3 outside recorded forest areas (MoEFCC 2019).

3.1.3 Production data:-

India's annual total wood production (including bamboo) has been estimated at 438.14 million m3 . When fuel wood production is excluded, this volume falls to 52.89 million m3 . 14 Recycled and reclaimed wood also contributes to the supply but the volume is limited (Vanam 2019). Table 1 presents the production breakdown. The majority of wood or timber produced in India is fuel wood, followed by saw logs and veneer logs (Figure 6). India produced around 200,000 m3 of MDF and 295,000 m3 of veneer sheets based on the latest available data reported for 2018 (FAO 2020).

Table 1. Annual estimated wood production in India (million m3)

Type	Production volume (Million M3)
Natural forests (excluding State Forest Development Corporations)	1.21
Natural forests (State Forest Development Corporations)	1.97
Trees outside recorded forest land	44.34
Bamboo15	5.38
Fuel wood	385.25

Source: Adapted from Shrivastava and Saxena 2017

States like Punjab, Uttar Pradesh, Gujarat, Jammu and Kashmir, West Bengal, Kerala, and Andhra Pradesh, North East India are among the leading suppliers of domestic wood for the manufacturing and processing industries, and particularly, the country's furniture sector (AHEC 2016).

3.1.4 Domestic species:-

The best available production data of species are reported by forest type: trees within the designated forest area and trees outside forest.

- Sal (Shorea robusta) is most widely grown in India and accounts for around 8 percent of India's total national growing stock.
- Mango (Mangifera indica) accounts for around 4 percent of the total volume of growing stock and is produced outside forest areas in agro forestry plantations.
- Teak (Tectona grandis) accounts for roughly 3 percent of national growing stock (Figure 7) (MoEFCC 2019). Other key species based on growing stock include:
- Pine (both Pinus roxburghii and Pinus wallichiana)
- Indian Laurel (Terminalia tomentosa)
- Neem/Indian lilac (Azadirachta indica)

3.1.5 Risk of illegality in domestic grown wood:-

Several legality risks are present in India, many of which are related to the legal rights to harvest and third parties' rights, non-payment of taxes and fees, and non-compliance with national laws and regulations covering timber-harvesting operations, transport and trade (NEPCon 2017a). NEPCon's 2017 Timber Risk Assessment for India, the most comprehensive review to date, summarizes the legality risk as follows

a) **Rights to harvest**:-

- Non-recognition and violation of forest-dwellers' rights
- Forest encroachment and illegal logging conducted on land not under the legal tenure of Loggers, often supported by government official corruption
- harvesting without a permit
- over-harvesting on permitted volumes

b) **Taxes and fees**:-

- Private businesses not paying the correct royalties and harvesting fees
- Widespread VAT evasion and corruption in the implementation of VAT laws
- Non - declaration/under-reporting of incomes and profits
- corruption among tax authorities

c) **Timber-harvesting activities**:-

- illegal harvesting within protected areas
- protected species being illegally harvested due to the prevalence of illicit logging and corruption among government officials

Violation of labour laws, such as non-payment of minimum wages, use of child labour, and incidences of bonded labour have also been reported as risks.

3.2 Imports:-

The total annual volume of imported timber has been estimated at 18.01 million m3 or roughly 25 percent of India's total available supply (including bamboo) based on 2015 import data.16 India's imports of timber products and pulp have almost doubled in value over the past decade (Figure 8). While still early to determine the full impacts of COVID-19 on global timber trade, India's reporting for the period January to May 2020 shows that total timber and pulp imports were down 82 percent by value compared to the same five-

month period in 2019. This includes an 84 percent drop in log imports and an 82 percent decrease in both sawn wood and veneer imports. Imports were down from all major source countries.

Several industry studies estimate that India's imports will continue to increase as domestic and export demand continue to build, and as government incentives encourage the domestic furniture industry. Rising imports reflect increasing overall demand for raw materials as well as an increasing demand for new imported species (Sood 2019). Shrivastava and Saxena estimate an annual volume increase from 18.01 million m3 based on 2015 data to 22.51 million m3 by 2020; to 27.91 million m3 by 2025; and reaching 31.5 million m3 by 2030 (2017).

The main products imported into India since 2010 include pulp, logs, sawn wood, and veneer to support a growing construction, manufacturing and processing industry. Together, these four products accounted for 79 percent of India's forest product imports by value in 2019. Log imports have been declining since 2014. Sawn wood and veneer imports have been slowly increasing
India's imports of logs have declined dramatically by 50 percent since 2014 (Figure 10), with a particular shock in 2014 and 2015 when the Governments of Myanmar and Lao People's Democratic Republic (Lao PDR) began to enforce log export bans, or due to reduced log export quotas, such as Malaysia imposed on its exports. Declining availability and rising costs of logs from the state of Sarawak have reportedly led a number of Indian companies to look outside Malaysia to other log suppliers.

The top source countries since 2010 have been New Zealand, Malaysia, Suriname, Papua New Guinea, Costa Rica, Ghana, Ecuador, and the Solomon Islands, which together accounted for 69 percent of log imports by value in 2019. In 2013, prior to log export restrictions in key markets, Myanmar, Malaysia, and New Zealand supplied 75 percent of India's log imports. By 2019, India reported just 35 percent of log imports from Malaysia and New Zealand, and none from Myanmar. Over this time period, Indian log importers have switched sourcing away from Myanmar and Malaysia to Singapore (a country with no commercial forests), Brazil, the Solomon Islands, Suriname, Ghana, Panama, and Ecuador, which now supply 40 percent of India's log imports

As log imports have declined, Indian companies have increased their sawn wood imports by 723 percent between 2010 and 2019. However, the total values of these sawn wood imports remain well below the values of total log imports (Figure 11). Malaysia is a key source country for sawn wood, along with Germany, Myanmar, Indonesia, the United States, and Brazil. As log imports have declined, Indian companies have diversified sawn wood imports from new countries, particularly Côte d'Ivoire, South Sudan, and Lithuania, as well as Papua New Guinea, Ecuador, Singapore, Ukraine, Sweden, and Benin.

Decorative hardwood sawn timber was initially imported from the United States and Canada but increasing imports of sawn timber from Malaysia, Indonesia, and Myanmar have been significant. This has particularly been the case in the past five years as the import duty on sawn timber from the Association of Southeast Asian Nations (ASEAN) countries has fallen to zero, which has significantly impacted Indian sourcing
Indian companies increased veneer sourcing from Asia by 1,510 percent between 2010 and 2019. There was a rapid rise in sourcing from Myanmar and Indonesia after 2014, and a more recent spike in sourcing from Gabon in 2018 and 2019 following mill investments by Indian companies from 2013 in Myanmar (Moe 2014) and from 2016 in Gabon (ITTO 2016). Seven countries supplied 90 percent of India's veneer imports in 2019: Gabon, Myanmar, Indonesia, China, Vietnam, Italy, and the United States. Gabon alone now supplies one-third of India's total veneer imports.

3.3 India's Import-related Risks of Illegal Deforestation

Poor governance and corruption have been shown to correlate frequently with the failure of a country's public sector to enforce relevant laws or regulate industries effectively (Forest Trends 2017c). Nearly half of the world's forests are in nations with what Transparency International calls "rampant" corruption (Sundstrom 2016). Most of the forest crimes identified by Interpol and the United Nations Environment Programme (UNEP) result from the inability of state forest administrations to enforce laws that regulate timber harvesting and trade (Nellemann et al. 2016). The complicity of government officials in corruption in many states undermines the enforcement of laws and regulations relating to forest protection and management, and the reliability of chain of custody systems. This suggests an increased risk of buying illegal wood.

In addition, fragile and conflict-affected states face particularly severe development and governance challenges and are characterized by weak institutional capacity, ineffective rule of law, political instability, and the threat or reality of ongoing violence at variable scales. As a result, political instability and violence inherent in these states raises the likelihood of buying illegal timber by a significant measure (Forest Trends 2017b; Forest Trends 2020).

In general, forest crimes and illegal logging in many timber-producing countries are not well documented, and consistent global data on illegal logging do not exist (Forest Trends 2017c). By its very nature, as an illicit act, the extent and nature of illegal logging are difficult to monitor systematically, and efforts are taken to hide i

Forest Trends has also developed a risk assessment approach that follows a growing body of work using existing data and metrics related to national governance, corruption, conflict, and harvest-risk indicators to highlight the likelihood that timber may have been illegally logged in a source country, or the likelihood that illegal wood may have entered a supply chain.18

As such, to understand the risks associated with India's imported timber, this report therefore draws on three main and inter-related "risk" categories: (a) political governance and conflict risk; (b) species risk; and (c) risk of export in violation of source country restrictions.

3.3.1. Political governance and conflict risk associated with India's imports::-

Around 42 percent of India's timber imports in 2019, including 44 percent of logs, 42 percent of sawn wood and more than 75 percent of veneer imports, were sourced from countries assessed as being at high risk of illegal logging and trade based on governance, corruption and harvest indicators, or from conflict states as categorized by the World Bank (Figure 13). This suggests significant risks that illegal timber could be entering supply chains via imports, including in furniture and handicraft products manufactured in India.

India's top 10 high risk source countries for logs, sawn wood, and veneer in 2019 were Gabon (Box 2), Ecuador, Brazil, Ghana, Suriname, Benin, Ukraine, Tanzania, Colombia, and Togo.

India's main source countries on the World Bank's list of fragile and conflict-affected situations for 2019 include Myanmar (Box 3), Papua New Guinea, the Solomon Islands, Nigeria, Cameroon, South Sudan, Republic of Congo, Liberia, Sudan, and the Central African Republic

Indian imports from Gabon, particularly of veneer, have been rapidly increasing since 2018, and Indian companies have invested heavily in facilities within Gabon itself, settling in special economic zones (SEZ) and building sawmills, kiln-drying facilities, and furniture, veneer and plywood manufacturing units (ITTO 2016). In the Nkok SEZ, 17 out of 96 industrial investors in 2016 were from India. Gabonese species such as oukumé have only recently been accepted by the Indian market for panels and ply veneers, replacing imports from countries such as Indonesia, Papua New Guinea, and the Solomon Islands (Global Wood Markets Info 2017).

Gabon's forestry sector has long been critiqued for lacking transparency; public information on production, exports, and legal compliance with national legislation by licensed logging companies is scarce. NGOs continue to document sector-wide illegalities, widespread corruption, and illegal timber being sold on international markets.

Brain forest, a Gabonese NGO, and the Environmental Investigation Agency (EIA) have released reports, in 2010 and 2019 respectively, presenting detailed evidence of sector-wide illegalities including tax evasion, money-laundering and corruption, as well as overharvesting (EIA 2019). Crackdowns by the Gabonese authorities targeting a dozen companies in 2017 exposed further evidence of illegality in the sector, including the illegal felling of protected species. In 2019, Gabon's president sacked the vice-president and forestry minister over a timber-smuggling scandal surrounding the seizure and subsequent theft of containers of kevazingo (Dewast 2019).

These combined governmental and NGO initiatives highlight how sourcing timber from Gabon continues to be high risk.

In recognition of the challenges, in 2018, Gabon's president declared that all forest concessions operating in Gabon will have to be certified by the Forest Stewardship Council (FSC) by 2022 (FSC 2020). The government has estimated that with these new measures, the sector will increase its contribution to GDP from 500 million euros to 3,000 billion euros by 2025

Reported Illegal Logging Risks in Myanmar:-

Myanmar has the largest area of natural teak forests in the world – almost 50 percent of the 29 million ha across the globe. Until the Union Government of Myanmar (UGoM) instituted a log export ban and significantly reduced the annual allowable cut (AAC) in its teak forests (FAO 2015), Myanmar was the number one producer and exporter of teak logs in the world.

Yet there are significant reports of corruption, weak forest governance and law enforcement in Myanmar's forest sector (EIA 2019). Illegal harvesting in conflict areas such as Kachin State (EIA 2015); irregularities associated with forest conversion for all species (World Bank 2019); human rights violations (UNHRC 2019); and the mixing of timber from unknown sources has been reported (NEPCon 2017b; Forest Trends 2013; European Commission 2017; UNEP-WCMC 2018). In 2018, the European Commission and EU Member States jointly developed a common enforcement position, concluding that it was impossible to buy teak from Myanmar that complies with European Union Timber Regulation (EUTR). This position has been maintained ever since. Strong concerns have been raised regarding "the high level of corruption in Myanmar, in particular in the context of forestry, the exclusive forest ownership by the State and management by the State-owned enterprise MTE [Myanma Timber Enterprise] of natural forests, and the high value of teak grown in the wild …[This means that] … Myanmar remains a high risk country of harvest….The State itself is at risk of being in contravention of the law" (European Commission 2019). A number of EU Member States have started seizing Myanmar teak and/or returning shipments to both Myanmar and countries within longer supply chains such as India (Forest Trends 2020).

The 2018 FSC National Risk Assessment for Myanmar identified a wide range of key risks including: illegal assignment of harvest permits; illegal conversion of forest areas to agriculture; avoidance of paying royalties, harvesting fees and taxes; violation of forest management laws, regulations and rules; conflicts over land resources and involving Indigenous Peoples; and the falsification of documents which are all paper-based (FSC 2018).

India–Myanmar trade historically teak has been a key import species for India, sourcing close to one-third of all log imports from Myanmar between 2010 and 2014. However, since April 2014, the UGoM enacted a log export ban and reduced the AAC. Subsequently, Indian companies began investing in basic mills within Myanmar itself as well as diversifying their sources of teak, eventually sourcing teak logs, sawn wood and veneer from more than 50 countries between 2016 and 2019. Indian buyers also began to source other Myanmar species. Until 2018, India continued to report some log imports from Myanmar in contravention of the export ban; today, sawn wood and veneer imports have increased significantly.

Through a detailed assessment of shipment record data, Forest Trends found that Indian companies imported more keruing (Dipterocarpus spp.) than teak (based on value) between October 2016 and September 2019. Nearly 60 percent of India's log, sawn wood and veneer imports from Myanmar were described as keruing. Teak accounted for 28 percent of India's imports from Myanmar (by value) over the period, with pyinkado (Myanmar Ironwood, or Xylia xylocarpa) accounting for 12 percent of imports.

Timber that does not transit through Yangon for export is illegal under Myanmar law. India and Myanmar share a land border including two main border crossings with customs stations: Tamu, Sagaing in Myanmar to Moreh, Manipur, India; and Rih, Chin State in Myanmar to Zokhawatar, Mizoram in India

A recent report suggests that the quantities passing by land into India were likely to be relatively small due to the remoteness of the border region with its inadequate infrastructure for transporting wood products. However, respondents in the study did confirm an informal trade of timber crossing the border at night, with traders mainly operating from Manipur with timber illegally sourced from protected forests (Maria-Sube and Wood gate 2018).

The Governments of India and Myanmar signed a Memorandum of Understanding in February 2020 aimed at Cooperation on Combating Timber Trafficking, and Conservation of Tigers and other Wildlife, but at the time of this report, little detailed information was released other than that training of Myanmar officials would be involved (GoI 2020).

4. Furniture and Handicrafts Industry:

India's furniture industry includes a few large companies which are well organized, but 90 percent of the industry is small-scale or "unorganized" (Hashmi 2012), where most wooden furniture, joinery, and other household products are made to order by small workshops or individual artisans. The Association of Furniture Manufacturers and Traders reports that the organized large furniture industry has been growing 20 percent annually (Financial Express 2018). Companies include Nilkamal Limited, Godrej & Boyce Manufacturing Co. Ltd., Zuari Global Ltd, Wipro Enterprises Ltd., Furniturewalla, Featherlite, Millennium Lifestyles, Urban Ladder, Damro, Pepperfry and IKEA. There are little to no data on the SME and artisanal subsector growth. The furniture-manufacturing industry was estimated to employ roughly 4.1 million workers in 2013, concentrated in manufacturing centers in Maharashtra, Gujarat, Uttar Pradesh, Bihar, and West Bengal (AHEC 2016). The National Skill Development Corporation in India states that the industry will require 11.3 million skilled workers by 2022 (The Economic Times 2015)

Some of the most common varieties of wood used in handicrafts and furniture include: teak, sheesham, sal, oak, mango, and mahogany

4.1 Species Used in Furniture Production

Nearly one-third of all handicrafts manufacturers reportedly use reclaimed wood (AHEC 2016). Some of the most common varieties of wood used in handicrafts and furniture include: teak, sheesham, sal, oak, mango, and mahogany. Sandalwood, ebony, rosewood, and walnut are considered exotic varieties and are highly expensive raw materials. All of these species are both grown domestically within India and are also imported (see Section 3; Table 2; and Box 4). Teak is reportedly the most commonly used species in wooden furniture production in India. Artisans working in the furniture and handicrafts sector are accustomed to and prefer teak and other hardwoods that are perceived to be more resistant to termites and decay. Indian consumers have historically had a strong preference for dark tropical woods.

Teak is typically seen as a benchmark with respect to grade and price, as compared to other wood species (Sood 2019). Government figures suggest that as much as half of the furniture manufactured in India uses teak; 30 percent is manufactured from mango, sheesham, mahogany, and cedar; and roughly 20 percent from sal (EPCH 2017).

The reported scale of teak usage in furniture is particularly at odds with what this report found through analyzing India's furniture exports. Just 1 percent of India's global exports of HS code 940360 listed teak as a component species. Given that a high percentage of export shipments did not list a species, it is possible that a higher proportion of shipments could contain teak. However, it is also possible that a much higher proportion of teak furniture remains on the Indian domestic market where it is a popular material particularly in western and southern regions of India (EPCH 2017

Main species used in Indian manufactured furniture and handicraft production2

Species Name Other common name(s)	Scientific name of species grown in India Geographic extent within India	Volumes and risk assessment of imported species (listed on shipping manifests Oct 2016-Oct 2019)* *Based on 97 percent of imports by value listing a species	Species risk: CITES and IUCN Red List
Mango	Mangifera indica Grown throughout India	Very low imports by value Low risk: 100% China (plantation)	Not listed
Teak	**Tectona grandis**	**Large volume of**	**Not listed**

	Throughout central , NER and southern India	**imports by value High risk: 80% from high-risk countries or conflict states, even when plantation teak**	
Pine	Pinus wallichiana, Pinus kesiya Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Uttarakhand	Large volume of imports by value: Pinus radiata, Pinus sylvestris and Pinus spp. Low risk: Majority sourced from low risk countries High risk: 4.45% sourced from high risk countries such as Ukraine and Russia	IUCN Red List: Pinus wallichiana Least Concern Pinus kesiya Least Concer

Red sanders or red sandalwood (Pterocarpus santalinus) is endemic to several districts in Andhra Pradesh and some parts of Tamil Nadu and Karnataka in India (Arunkumar and Joshi 2014). Traditionally, the wood has been in high demand for furniture, and for medicinal uses, particularly for domestic markets as well as international markets such as China and Japan.

Overexploitation to meet domestic and international demand prompted the Government of India to recommend inclusion of red sanders under CITES protections in the 1980s. In particular, prices on the international market were double than when sold domestically. Red sanders were listed in Appendix II of CITES in 1995, and the Government of India subsequently banned export in 2004. Individual states regulated the domestic trade of red sanders through a process of multiple permits (Kukreti 2018).

In 2010, the Indian government submitted a **Non-Detriment Finding** (NDF) requesting permission to export from cultivated sources. India set a CITES annual export quota21 for red sanders which meant that 310 metric tons of red sanders obtained from "artificially propagated" sources (grown on farms) could be exported annually. Farmers are allowed to "artificially propagate" red sanders but require a permit for harvesting and transportation – a permit which has been reportedly difficult to obtain.

The Directorate General of Foreign Trade (DGFT), an agency of the Indian Ministry of Commerce and Industry, has a 2018 export policy which includes product-specific rules for all Indian Tariff Codes (ITC), although a 2019 policy has been drafted and is under discussion.

Under the 2018 policy, the export of red sanders wood in any form is "prohibited" yet certain value-added products are listed in the "restricted" category and therefore can be exported with a license.22 to permit export, the Indian government requires that the red sanders wood is procured from legal sources, including red sanders obtained from cultivated land (Kukreti 2019). Log exports of red sanders are prohibited; however seized logs are exempted depending on the regulations of the individual Indian state government, which vary. While there have been large, widely publicized national government seizures of volumes of red sanders logs in recent years, more research is needed to understand the documentation needed for seized logs to be legally exported.

Thousands of metric tons of red sandalwood logs and other timber products have been smuggled illegally out of southern India in recent years with a recent seizure of 8 metric tons of illegal red sander logs by Malaysian Customs in July 2020 highlighting the continuing illegal trade (TRAFFIC 2020)

4.2 Materials Used in Furniture Production:-

This desk-based study was not able to determine the proportion of India's furniture exports that are solid wood or are constructed using engineered wood. Indian producers have traditionally used wood panels but there are now calls to increase the use of MDF as a substitute for local plywood and particle boards. Globally, MDF is used in 80 percent of furniture but India has only used MDF in 20 percent of furniture to date (Panels and Furniture Asia 2018). From analysis of detailed shipment level data, Forest Trends found that at least 12 percent (by value) of India's exports of HS code 940360 "other wooden furniture" reported MDF in the product description
4.3 Location

Rajasthan and Uttar Pradesh states have the largest number of furniture manufacturers (EPCH 2017). Some of the prominent centers for wooden handicrafts and furniture production are summarized in Table 3. They include Saharanpur and Nagina in Uttar Pradesh, Hoshiarpur and Amritsar in Punjab, Jaipur and Jodhpur in Rajasthan, Srinagar in Jammu and Kashmir, Jagdalpur and Behrampur in West Bengal, Chennapatna and Chennai in Tamil Nadu, Bengaluru and Mysore in Karnataka, and Ernakulam and Cochin in Kerala. Jodhpur in Rajasthan now has a strong presence in the international wooden furniture markets

Furniture and handicraft hubs in India

State/District/Cluster	**Crafts**

Srinagar - Jammu & Kashmir	Walnut & Deodar Wood Craft
Saharanpur - Uttar Pradesh	Wood Carvings Furniture, Screens
Nagina - Uttar Pradesh	Wood Carvings Boxes
Jodhpur - Rajasthan	Wooden Handicrafts, Furniture & Giftwares
Kolkata - West Bengal	Wooden Furniture & Giftwares
Kondapalli - Andhra Pradesh	Wood (Turning and Lacquer Ware)
Chennapatna - Karnataka	Wood Inlay Articles
Chennai - Tamil Nadu	Wooden Handicrafts Antique Finish
Quilandy - Kerala	Coconut Wood/Coconut Shell Gift Articles
Trivandrum - Kerala	Rose Wood Carvings Gift Wares
North East Region	Cane & Bamboo - Furniture and other Home Utility Products

Source: EPCH 2017

4.4 Jodhpur as the Main Hub for Furniture Exports to the United States and Europe:-

More than 50 percent of India's furniture exports to the United States and the EU+EFTA countries in 2019 came from Jodhpur. Around 75 percent of the handicrafts produced in Jodhpur were made from wood, including small gift articles, carved items, toys, and furniture.

More than 500 handicraft-manufacturing units are concentrated in Jodhpur itself, with about half focused on export markets (TRAFFIC India n.d.).

Only about 10 percent of these handicraft exporters import raw materials. For those that import materials, species include teak and oak. MDF is imported mostly from Malaysia and New Zealand. A review of the Jodhpur handicraft industry found roughly one-third of operators using sheesham (Dalbergia sisso) which is often sourced from Sri Ganganagar in Rajasthan, Uttar Pradesh, Punjab and Bihar (TRAFFIC India n.d.).

Only large manufacturers of handicrafts are found to import wood materials from other countries, purchasing imported raw materials through agents in Delhi.

4.5 Other Manufacturing Centers:-

Forest Trends analyzed shipping manifest data for India's 2019 exports to regulated markets. This showed that other key centers include Delhi (accounting for 18 percent of India's exports of HS codes 940360 and 4421 to the United States and 3 percent to EU+EFTA in 2019); and Jaipur (12 percent of exports to the United States and 24 percent of exports to the EU+EFTA).

Mumbai and Bangalore, while only accounting for 1 percent of India's 2019 exports to the United States and 0.6 percent of exports to EU+EFTA countries, were most likely to export teak "other wooden furniture". Mumbai produced the most teak furniture exported to the United States in 2019. More than 60 percent of HS code 940360 "other wooden furniture" produced in Bangalore and exported to the United States included teak. The other 40 percent of export manifests did not include any species information. Together Mumbai and Bangalore produced more than 60 percent of the teak furniture under HS code 940360 exported to EU+EFTA countries in 2019.

Jaipur and Sikar in Rajasthan were key centers for production of "other wooden furniture" using sheesham and accounted for almost 60 percent of India's exports of sheesham furniture under HS code 940360 to both the United States and EU+EFTA countries in 2019. All of the exports originating from Sikar reported sheesham as the main furniture component

4.6 Certification

While there are a number of certification systems in use in India today, only 521,680 ha of Indian forest area were reported as certified in 2018, predominantly under the FSC or the Programme for Endorsement of Forest Certification (PEFC 2020; FAO 2020c). While there are also several chain of custody certification systems, only a few furniture factories or artisans use them. Where they are in use, the Indian standard VRKISH, and the international standards of FSC and PEFC, are most common. Interviews conducted for this study suggest that while quite a few companies have been obtaining VRKISH certification over the last few years, this concerns still a relatively small proportion of companies overall (Box 5). These standards have varying levels of robustness and scope.

As of June 2020, 750 companies were FSC Chain of Custody (CoC) certified. This is still a relatively low number (roughly equal to the number of CoC certificates for Hong Kong), considering the market size in India.

PEFC is represented in India through the Network for Certification and Conservation of Forests (NCCF), which developed national forest management certification standards endorsed by

PEFC International in 2019 (PEFC n.d.). Around 40 companies were PEFC CoC-certified as of June 2020.

The large numbers of SMEs working in the timber industry have reported significant challenges in demonstrating the legality of their timber, despite acknowledging how certification is critical for a growing number of their export markets (EPCH 2017).

In 2017, the Export Promotion Council for Handicrafts (EPCH) was also added to the list of CITES management authorities competent to issue comparable documentation in relation to trade in specimens of Dalbergia spp. included in Appendix II (Dalbergia sisso and Dalbergia latifolia), demonstrating that their products are manufactured from timber that has been legally acquired.

E.g. (VRIKSH):-

The Export Promotion Council for Handicrafts (EPCH) developed the VRIKSH standard in 2014 to support the exporters of wooden handicrafts in India supplying European and U.S. markets (VRIKSH n.d.). VRIKSH is designed to certify the legal right to harvest and trade as well as compliance with local legislation, all taxes and royalties, and all other requirements for the trade and export of domestically produced timber. Companies receive certification for a five-year period that is subject to an annual surveillance audit. As of July 2020, there were 218 valid certificates for VRIKSH-certified exporters (VRIKSH n.d.) While the VRIKSH legality assessment and verification standard includes provisions to ensure timber has been legally imported, importers are only required to make documents available detailing the source country and species, the value of the timber and a phytosanitary certificate in addition to other regulatory documents which are not further detailed. In general, the VRIKSH system is designed to show that companies are able to trace their product from the forest all the way to individual consignments through a series of checks and balances. Barber and Winfield note that this is a document-based system which could be vulnerable to fraud, as they were "unable to determine whether anyone can actually verify that the wood in a particular shipment actually CAME from where the paperwork says it comes from" (CITES 2019). There remains a risk that VRIKSH-certified products may have been harvested from areas other than noted in the paperwork. Robust, third-party certification can be considered as a tool to help mitigate high risk sourcing but should not constitute sufficient due diligence for legality in and of itself. Under the EUTR, for example, certification or other third-party verified systems may be taken into account in the risk assessment and risk mitigation, but these do not grant automatic compliance. The U.S. Lacey Act, for example, is a fact-based statute with strict liability, which means that only actual legality counts and no third-party certification or verification schemes can be used to "prove" legality under the Act.

5.0 India's Exposure to Environmentally Conscious Markets

India's exports are overwhelmingly destined for countries that have already taken action to develop import regulations designed to exclude illegally logged timber from their markets. By 2019, 78 percent of all timber products (Figure 17), and 92 percent of wooden furniture products (Figure 18) were exported to countries with import controls in place designed to exclude illegal timber from their markets

5.1 Trade to Markets with Regulations Designed to Exclude Illegal Timber

Regulations to tackle the trade in illegal wood have now been operational for several years across the EU (through the EUTR), in the United States (through the U.S. Lacey Act) and in Australia (through the ILPA). Implementation and enforcement modalities are well established (Forest Trends 2017a). More recently, Japan and the Republic of Korea have developed regulations to exclude illegal wood imports, while Indonesia, Vietnam and Thailand have committed to exclude illegal timber from their imports as a key component of the timber legality assurance systems that underpin Forest Law Enforcement Governance and Trade (FLEGT) Voluntary Partnership Agreements (VPAs) (Forest Trends 2019).

5.2 Species in India's Exports to Regulated Markets

Forest Trends analyzed all detailed shipment record data for India's two main timber product exports to regulated consumer markets in 2019 (the United States, EU+EFTA, Australia, Japan, and the Republic of Korea). These two exports – "other wooden furniture" (HS 940360) and "other articles of wood" (HS 4421) which includes a number of wooden handicraft products – constitute more than 60 percent of India's timber product exports.25 The aim of the analysis was to assess the risk (based on species, and likely source country) associated with the main products exported by India to regulated markets in 2019. From this, Forest Trends was able to determine the extent to which Indian exporters are likely to be using domestically grown and harvested species, or species imported from other countries.

Shipping records contain more information than public international trade datasets such as UN Comtrade or Eurostat. For example, shipment record data provide information on the importer, supplier, port and the product through a description field, which may include information on the species. These detailed data therefore allow a more comprehensive analysis of the species used in products that are destined for markets such as the United States and the EU+EFTA. While some of this information is collected by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) through the Lacey Act declaration requirement, or by Customs Authorities, the data are not made publicly available.

The Government of India, as well as other governments in consumer countries, do not mandate exporters to list species information on shipping manifests, except for products produced with CITES-listed species. Thus, some of the shipment record data do not list information on species, while other shipment records provide detailed information on one or more species, typically in the product description section. Where shipment-level species information is listed, these manifests are often incomplete and misleading, and there have reportedly been frequent seizures of wood exported illegally from India due to false customs declarations (NEPCon 2017a).

Incorrect specification of species, quantity and quality of forest products are commonly used to evade taxes and tariffs, and possibly import regulations like the U.S. Lacey Act and the EUTR (NEPCon 2017).

5.2.1. Shipments to the United States

Forest Trends analyzed the detailed shipment records of all 111,508 shipments of HS 940360 and all 68,389 shipments of HS 4421 exported to the United States in 2019

a**) Other wooden furniture (HS 940360):**
-20 species were referenced in the shipment records.
- Around two-thirds of the shipment records did not list any species information.
- Where information was provided, the most frequently listed species were mango (24 percent of all shipments to the United States by value), acacia (9 percent), and pine (3 percent).
- Sheesham accounted for roughly 2 percent and teak accounted for 1 percent of India's other wooden furniture exports to the United States in 2019.
- 2 shipments listed ebony and one shipment listed merbau.

b**) Other articles of wood (HS 4421):**

- 36 species were listed in the shipment records.
- Around two-thirds of the shipment records did not list any species information. Where information was provided, the most frequently listed species were mango (26 percent of all shipments to the United States by value), acacia (3 percent), as well as pine and sheesham (each roughly accounting for 1 percent of all shipments by value).
- Teak accounted for roughly 0.5 percent of India's exports of other articles of wood to the United States in 2019.
- Other species referenced in the detailed shipment record data include ebony (0.1 percent of shipments by value), mahogany (0.02 percent), and sandalwood (0.01 percent).

A full breakdown of species found in India's exports of HS codes 940630 and 4421 to the United States is provided in Annex I.

5.2.2. Shipments to EU+EFTA countries

Forest Trends analyzed the detailed shipment records of all 155,623 shipments of "other wooden furniture" (HS code 940360) and 47,626 shipments of "other articles of wood" (HS code 4421) to the EU and EFTA countries in 2019. While other wooden furniture is within the product scope of the EUTR, HS code 4421 is currently outside the scope, and imports of HS 4421 are therefore exempt from the requirements of the EUTR.

a**) Other wooden furniture (HS 940360):**
- 24 species were referenced in the shipment records.
- Roughly 64 percent of shipments did not reference any species information. Where information was provided, the most frequently listed species were mango (19 percent of all shipments to the EU+EFTA by value), acacia (12 percent), sheesham (7 percent).
- Oak, pine and teak each roughly accounted for 1 percent of shipments by value.
- 2 shipments listed mahogany, 2 shipments listed marbau/vengai, and 2 shipments listed "African timber". All were exported to the United Kingdom

b)Other articles of wood (HS 4421):

- 38 species were referenced in the shipment records.
- More than 70 percent of shipment records did not include any species information. Where species were listed in the product descriptions, the most frequently cited species were mango (23 percent of all shipments by value), acacia (3 percent), as well as teak and sheesham both accounting for roughly 1 percent of India's other articles of wood exports in 2019.
- Other species referenced in the detailed shipment record data include ebony (0.03 percent of shipments by value), mahogany (0.1 percent), and meranti (0.01 percent).

A full breakdown of species found in India's exports of HS codes 960430 and 4421 to EU+EFTA countries is provided in Annex I

5.2.3Shipments to Australia

Forest Trends analyzed the detailed shipment records of all 12,257 shipments of HS code 940360 and all 8,869 shipments of HS code 4421 exported to Australia in 2019. Other wooden furniture is within the product scope of ILPA, but HS code 4421 is currently outside the scope and imports of HS code 4421 are therefore exempt from the requirements of the Australian ILPA

a) Other wooden furniture (HS 940360):
- 12 species were referenced in the shipment records.

- Roughly 64 percent of shipments did not reference any species information. Where information was provided, the most frequently listed species were mango (24 percent of all shipments to Australia by value), acacia (10 percent), sheesham (5 percent).
- Pine and teak each roughly accounted for 1 percent of shipments by value.
- 1 shipment listed ebony

b) Other articles of wood (HS 4421):
- 18 species were referenced in the shipment records.
- Roughly 63 percent of manifests did not include any species information. Where species were listed in the product descriptions, the most frequently cited species were acacia (18 percent of all shipments by value), mango (17 percent), as well sheesham (3 percent of exports by value), and teak (accounting for roughly 1 percent of India's other articles of wood exports in 2019).

A full breakdown of species found in India's exports of HS codes 940630 and 4421 to Australia is provided in Annex I.

5.2.4 Shipments to Japan
Forest Trends analyzed the detailed shipment records of all 1,397 shipments of HS code 940360 and all 1,407 shipments of HS code 4421 exported to Japan in 2019. The Japanese Clean Wood Act covers a broad range of products including wooden furniture but "other articles of wood" under HS code 4421 appears to be outside the scope of the Clean Wood Act.

a) Other wooden furniture (HS 940360):
- 5 species were referenced in the shipment records.
- Roughly 60 percent of shipments did not reference any species information. Where information was provided, the most frequently listed species were teak (19 percent of all shipments to Japan by value), acacia (12 percent), mango (6 percent), and sheesham (5 percent).

b) Other articles of wood (HS 4421):
- 13 species were referenced in the shipment records.
- More than 80 percent of manifests did not include any species information. Where species were listed in the product descriptions, the most frequently cited species were mango (11 percent of all shipments by value), sheesham (3 percent), as well as sandalwood (2 percent of shipments by value). - Beech and acacia each accounted for roughly 1 percent of India's other articles of wood exports in 2019).

A full breakdown of species found in India's exports of HS codes 940630 and 4421 to Japan is provided in Annex I.

5.2.5 Shipments to the Republic of Korea
Forest Trends analyzed the detailed shipment records of all 822 shipments of HS code 940360 and all 497 shipments of HS code 4421 exported to the Republic of Korea in 2019. The Korean Revised Act on the Sustainable Use of Timbers only covers seven HS codes and does not apply to either wood furniture or other articles of wood.

a) Other wooden furniture (HS 940360):
- 7 species were referenced in the shipment records.
- Roughly 64 percent of shipments did not reference any species information. Where species were listed in the product descriptions, the most frequently cited species were mango (27 percent of all shipments to the Republic of Korea by value), teak (6 percent), acacia (2 percent), pine (2 percent), and neem (1 percent)

b) Other articles of wood (HS 4421):
- 7 species were referenced in the shipment records.
- Roughly three-quarters of manifests did not include any species information. Where species were listed in the product descriptions, the most frequently cited species was mango (15 percent of all shipments by value), kadam (Neolamarckia cadamba) (6 percent), as well as teak and acacia which each accounted for roughly 1 percent of India's other articles of wood exports in 2019. A full breakdown of species found in India's exports of HS codes 940630 and 4421 to the Republic of Korea is provided in Annex I.

Despite the high proportion of shipments of "other wooden furniture" (HS 940360) and "other articles of wood" (HS 4421) that did not list a species, interviews conducted for this report suggest that exporters, particularly those supplying the U.S. and European markets, are predominantly using mango, acacia, and to a lesser extent, sheesham. This suggests that the findings presented are indicative of the current species mix used in India's furniture and handicraft exports to regulated markets such as the United States and the EU+EFTA.

5.2.6 Emerging evidence that exports to regulated markets include high risk imported timber

This study confirms that a number of Indian companies supplying regulated markets are also importing raw materials from high risk source countries. However, the study cannot confirm from where the specific timber used in furniture and handicrafts exported under HS codes 4421 and 940360 was sourced. Some examples uncovered in this study include:

-Teak: At least one company supplying hand-crafted teak doors to the United States had sourced teak from Myanmar in the period between 2016 and 2019. Several companies supplying the United States, EU+EFTA, and Australia had also imported teak from Ghana, Nigeria, Costa Rica, Ecuador, and Tanzania
-Ebony: At least one company supplying 18 shipments of ebony wood products under HS code 4421 to Germany was also found to be sourcing ebony logs listed as Diospyros crass flora from Nigeria in the period between 2016 and 2019. Nigeria reportedly bans the export of logs.
- Keruing: Several companies sourcing keruing from Myanmar were found to be supplying furniture and handicraft products to regulated markets in 2019 without any species information provided in the manifests. This included shipments to both the Netherlands and Australia.
- Mahogany: At least one company supplying regulated markets in the United States, EU+EFTA, and Australia had sourced mahogany veneer products from China in the period between 2016 and 2019

6. Summary Findings

The aim of this report is to outline India's growing prominence in the global wooden furniture and handicrafts sector, and to present a desk-based assessment of the main risks identified through an analysis of exports of "other wooden furniture" and "other articles of wood" (HS codes 940360 and 4421), with a particular focus on "regulated markets" such as the United States and the European Union, but also Australia, Japan, and the Republic of Korea.

As a result of increasing international and domestic demand, India is becoming a furniture-manufacturing hub, with timber product exports worth more than $1 billion in 2019, an increase of 138 percent by value since 2010. Demand is expected to increase exponentially in the next decade as India becomes one of the most competitive furniture- and handicraft-manufacturing centers in the region.

The Government of India has also taken steps towards potentially banning furniture imports in 2020, which, if implemented, will further increase domestic demand for Indian-made furniture. The government has sought to increase domestic productivity, particularly of trees in areas outside the designated forest area, such as agro forestry plantations and social forestry programs. Yet, overall production remains low, especially for the tree species preferred by India's furniture and handicrafts sectors. India has one of the highest rates of demand for fuel wood in the world, accounting for almost 90 percent of all domestic forest product consumption (FAO 2007; Shrivastava and Saxena 2017; Sood 2019). While poverty reduction strategies are reducing dependence on fuel wood, the Government of India reported just a 5.46 percent reduction in the overall demand for fuel wood in the past decade (MoEF 2019). This means that the majority of domestically produced timber is still used for fuel.

Demand for all forestry products (primarily timber and fuel wood) surpassed the domestic supply capacity in the mid-1990s. The gap between consumption and supply of timber was conservatively estimated at about 25 million m3 in 2006 and is likely to have grown significantly since (FAO 2007). The gap for high-value hardwood species is likely to be significantly larger.

India has relied increasingly on imports to fill this supply gap. Imports have almost doubled in the past decade. To date, imports have been estimated to account for roughly 25 percent of India's total available supply of timber and bamboo (excluding fuel wood), but this proportion is likely to rise in the next decade. Reports suggest that India's timber imports will increase from an annual volume of 18.01 million m3 (based on 2015 data) to 22.51 million m3 by 2020; 27.91 million m3 by 2025; and 31.5 million m3 by 2030 (Shrivastava and Saxena 2017). Recent economic concerns resulting from the COVID-19 pandemic have led the Indian government to consider other incentives to boost the domestic furniture industry further, including proposing to offer duty-free imports of raw materials (The Economic Times 2020).

Many of the countries supplying India with raw materials suffer from poor governance in their forest sectors, with the risk of corruption, illegal harvesting and document fraud considered to be high. The International Union of Forest Research Organizations estimates that India was the third-largest importer of illegally logged timber in the world in 2016, after China and Vietnam (Kleinschmit et al. 2016). India has not taken steps to develop a regulation specifically designed to exclude the import of wood products harvested and traded in violation of the laws and regulations in the source country. However, India has put in place a number of measures that regulate taxes (e.g., customs duties or royalties), sanitary and phytosanitary conditions, (e.gplant health), restricted and prohibited products (e.g., logs and debarked wood trade bans), as well as endangered species (e.g. CITES).

Without specific measures to ensure that India's imported raw materials are legally sourced, there is no guarantee that India's exports of manufactured timber products (furniture and other articles of wood) are verified as legal.

At the same time, more than three-quarters of India's timber products are exported to countries that now have laws in place to restrict the import of illegal wood and forest products. For furniture, this percentage rises to 90 percent. Importers those are non-compliant with those laws risk enforcement actions including fines, penalties, and prosecution, while Indian suppliers risk losing out to other countries that can provide the legal assurances requested. This includes the United States and the EU, but also in Australia, Indonesia, Japan, and the Republic of Korea, and will soon include Vietnam and Thailand. Buyers in these markets, as well as Indian exporters looking to maintain market access are therefore exposed to the risks associated with India's imported timber products.

This report will guide subsequent field research in several Indian furniture-manufacturing centers (Box 6).

Introduction:-

The report "State of the World's Forest Genetic Resources" published by FAO in 2014 lists tree species that are considered national priorities by the reporting countries
for the conservation and management of forest genetic resources. Teak (*Tectona grandis*) takes the top rank in this list in more than 20 countries. Economic value (including value of timber, pulp, food, wood energy, and non-wood forest products) is one of the main reasons for nominating the species as a priority for conservation and
management.

The international partners IUFRO, FAO, and TEAKNET acknowledge this priority and promote the initiation of a large-scale international research, development
and cooperation program. Its goal is to strengthen the conservation and sustainable use of teak genetic resources for the benefit of teak growers, the forest industries,
investors and local communities in different country contexts in Africa, Asia/Oceania and Latin America.

The following summary and policy recommendations have been developed and formulated on the occasion of a group meeting of 12 experts1 from 11 countries that was organised and held by IUFRO and FAO in Vienna, Austria, in December 2016.

The Global situation: -

Natural teak forests, in particular old-growth high-quality
stands are declining. Likewise the sustained production
of teak logs from natural forests is decreasing due to overexploitation
of existing stands, deforestation, conversion to other land-uses, and growing demand for environmental services from forests.

Nevertheless, teak is one of the few emerging valuable hardwood species that has been grown increasingly in planted forests in about 70 tropical countries throughout tropical Asia, Africa, Latin America and Oceania.

For most of these countries, albeit being an introduced species, teak represents a good opportunity to produce quality timber and is a major asset for the forestry economy attracting large investments from the private sector. Planted teak forests according to various estimates cover between 4.35 to 6.89 million ha.

They are known to exhibit a wide range of origin-related variation in growth and wood characteristics. Breeding programs continue to be developed in many countries aiming at improving timber quality of teak planted forests. Most of them, however, are established with seeds of uncertain origin and quality and more recently with clones being produced in countries such as Brazil, Costa Rica, Cote d'Ivoire, India, Indonesia, Malaysia, Tanzania or Thailand.

Genetic Variation in Teak Forests and Considerations for Tree Improvement:-

1. Provenance variation for economically and ecologically important traits has been investigated over the last 60 years and was found to be huge, but far from fully explored. Part of the genetic diversity that has been lost in natural forests may still be found in planted teak forests, many of which originate from the early introductions of
the species around the world. It is therefore of fundamental importance to further investigate and characterise teak genetic variation in planted and natural populations for breeding and mass propagation. Selection and testing of planting material continues to be highly relevant as an integral part of any major planting program. Strategic
plans at international, national and program level on the development and use of genetic resources ('genetic business plans') are important, whether in public-private partnerships, forestry investment schemes, or to the benefits of smallholder growers. The primary objective of such a plan should be to facilitate access to good quality planting material of well documented and reliable origin.

Strengthen International Collaboration and Regional Networks on Forest Genetic Resources:-

International collaboration and regional networks on forest genetic resources (e.g. TEAKNET, APFORGEN, SAFORGEN, LAFORGEN) should be strengthened to develop action plans for the conservation and management of teak genetic resources. Such action plans might include:

- development of geographic, operational, and reliable genetic resource databases for characterizing every teak origin and seed production stand with location maps
  and common descriptors.
- development of appropriate quality standards and accreditation schemes for teak planting material involving the germ plasma production and delivery sector, and current
  schemes for control of reproductive material (e.g. the OECD scheme on forest
  reproductive material);
- development of user-friendly decision support tools to guide the choice of planting material for specific sites (recommendation domains), in conjunction with market
  information services;
- measures to ensure that these standards and tools are mainstreamed with policy makers, extension services and the private sector, including manuals, policy briefs
  and other capacity building and extension material;

- development of indicators that are suitable to monitor the performance of delivery pathways with regard to standards including the performance and viability of plantings;

Improve the Management of Natural Teak Forests Towards Sustainability:-

- Strengthen forest governance and law enforcement by increasing transparency, by cooperating with local communities including other relevant stakeholders, and by mobilising funds for integrated land use planning, forest conservation, rehabilitation and restoration
- Review and improve the existing silvicultural systems and practises, such as applying a flexible schedule of silvicultural operations in individual stand management; in addition, secure in-situ conservation stands of natural teak forests on a wide range of site conditions (e.g. climate, soil, elevation) and complement these conservation measures through the establishment of seed orchards and gene banks
- Establish and implement performance and results-based compensation schemes (e.g. PES, REDD+) that are specifically designed to conserve and sustainably manage natural teak forests
- Include social aspects into forest management, addressing tenure and user rights of forest communities, cost and-benefit sharing arrangements as well as the empowerment of women, indigenous groups and minorities.

Support High-Quality Timber Production in Planted Forests:-

- Review and adapt government regulations and code s of-practise to facilitate site and stand- adapted silvicultural management
- Support the publication of teak growers' manuals in the respective local language, designed particularly for different target groups.
- Promote capacity building and awareness campaigns for various kinds of teak growers including smallholders and for operators.

Support Small-Scale Teak Production Systems for Smallholder Farmers:-

- National governments should encourage and support small holders to plant teak through incentive programs, marketing support, formation of cooperatives, access to land titles or long-lease land tenure
- Facilitate access to affordable sources of quality planting material for farmers
- Support the formation of farmer-industry partnerships, support group marketing schemes, simplify timber trade regulations and eliminate extra-legal fees to enhance market access while reducing transaction costs
- Regularly publish market information on teak prices and quality
- Provide silvicultural and agro-forestry management training through extension services for enhancing smallholders' technical knowledge and capacity.

Improve the International Marketability of Teak:-

An international forestry or timber trade organisation should take the mandate to develop and adopt an agreed set of log grading rules in collaboration with global buyers to reduce market constraints and to improve the marketability of teak wood products taking into consideration the quality and dimensions of logs from plantations as well as from natural forests. By the same token, public and private teak producers and processors are encouraged to pursue voluntary certification schemes (management and chain-of-custody certification) if they wish to meet environmental, social and economic standards of responsible forest management and gain better access to North American and European markets.

Provide Impartial and Unbiased Cost-Benefit Analyses for Potential Investors:-

To be profitable, teak plantations require stable and predictable market conditions as well as good forest management practices with the objective to increase yields and reduce costs through suitable operational measures. In order to support the application of such a management regime impartial and unbiased cost-benefit analyses on teak investments should be made available through publications, internet portals or information leaflets. TEAKNET could take a leading role in publishing such information on-line on its website.

Improve Statistical Information on Teak Round wood Production and Trade:-

A formalized exchange of information on the production and trade of teak would be of mutual advantage to importing and exporting countries. In this context reliable information on the dimensions, quality, origin and price of teak round wood and major wood products in internationally acknowledged measuring units should be made available on a regular basis.

Natural Teak Forests:-

Teak naturally occurs in four South and Southeast Asian countries, namely Myanmar, India, Lao PDR and Thailand (Figure 1). In 2010, the total area of natural teak forest in the aforementioned countries was estimated at about 29 million hectares and almost half of the total teak forest areas can be found in Myanmar (Kollert and Cherubini 2012). These four countries have practiced similar silvicultural systems on natural teak forests, depending on the forest types and site conditions. The earliest system of managing natural teak forests in these countries was the selection system: a given forest area was worked under predetermined felling cycle, minimum girth, and remaining mother trees as seed bearers to ensure natural regeneration of teak forests. The selection system aims at harvesting mature and over-mature trees across the entire forest area by preventing formation of large canopy openings in the long-term view. Theoretically, the system retains continuous forest cover while assuring soil fertility, maintains the unique floristic composition and uneven-aged structure of forest stands, and encourages resistance against pest and diseases (Bebarta, 2002). However, the area and growing stock of natural teak forests in their natural habitat have been gradually decreased for degradation is accelerated by over-exploitation for local uses (Tewari, 1992) and livestock grazing. In the case of Laos the teak forest area and growing stocks decreased due to population pressure, shifting cultivation, and forest fires (Anonymous 1998). The natural teak forests in Thailand decreased with economic growth, agricultural expansion, encroachment, illegal logging, shifting cultivation, and fires, etc (Sumantakul and Sangkul 1998; FAO and RECOFTC 2016).Nowadays, an assessment of the silvicultural system several reasons. In Myanmar it is obvious that the teak forests are declining due to logging (legal and illegal), agricultural expansion, shifting cultivation, and mining, etc., with an annual deforestation rate of 0.9% (FAO

and RECOFTC, 2016). In India, natural teak forestis applied in natural teak forests; whether the system has been perfectly and sufficiently applied in the prescribed silvicultural operations, is crucial for improving the system and an evaluation of the performance of the system by investigating the regeneration status of desirable species in the logged forests.

India

India is the largest country in South Asia with more than 0% of the total landmass of the region and is located between latitudes 8° N and 37° N and longitudes 68° 7' E and 97° 2' E. The elevation varies, ranging from an average elevation of 6000 meters above sea level in the mountainous region to 30 meters above sea level in the coastal areas. India has diversified climatic conditions, ranging from tropical wet to semi-arid and arid (Pant and Kumar, 1997, Ghassemi and White, 2007). The average annual temperature is varying from the Himalayas to the arid and semi-arid areas, with a temperature range of 5 °C to 40 °C in the hottest month and of 0 °C to 30 °C in the coldest month (Hussain, 2008). The humid North-East (North-Eastern India, Sikkim and North-Western West Bengal) receives the highest annual rainfall, i.e. 200 cm, and the arid region receives the lowest annual rainfall of less than 25 cm. India is the second largest populous nation in the world, with about 1.25 billion people in 2011 (Visaria and Ved 2016). There are 14 forest types in India, of which the subtropical dry deciduous, tropical moist deciduous, tropical thorn and tropical wet evergreen forests are important (Rawat and Ginwal 2009). Teak naturally grows in regions below 24° N latitude and natural teak forests covered about 6,810,000 hectare in 2010. Apart from Kerala, Tamil Nadu and parts of Maharashtra where artificial regeneration is applied, natural regeneration is the main tending practice in most parts of natural teak growing areas. Other silvicultural systems such as the coppice system, clear felling with conversion to uniform system, and the selection system with improvement felling are also applied in natural teak forests (Kumaravelu, 1991). Although the Indian forests were managed as an open access resource until the end of 1800, the Forest Act enacted in 1865 encouraged the state acquisition of forests (Haeuber, 1993). The earliest attempts to manage the natural forests of teak in India consisted of securing a sustainable supply of timber. In 1880, the rulers of India paid special attention to teak forests for providing quality wood for the navy and ship-building industry (Negi,1994). In 1980, India imposed a timber export ban on logs and lumber (Bourke, 1988)

Concluding Remarks:-

The following issues are critical for the success of teak plantations to produce solid timber quality:

- good site selection, use of genetically improved plant material, and adequate soil preparations are of utmost importance;
- careful planning of standing stock management, including initial spacing, thinning prescriptions, and harvest age based on biological and financial considerations to obtain the desired products in the shortest time possible;
- Timely execution of several operations. For example, consideration of planting time, pruning, and thinning operations;

- an early first thinning (3-to 8-year-old) depending on the desired products, site quality, and genetic material. This is necessary even if there is no market for the products, as it is essential to avoid an early decrease in tree diameter to obtain the largest stem size within the shortest possible time. Growers should not be afraid of doing intense thinning, especially at early stages. The investment made in cutting trees with little or no value will be largely compensated by the value obtained at the final crop.

- pruning to get knot-free high quality timber for the international markets
- assessment of nutrient needs of teak along the rotation. Standardise protocols to evaluate fertilisation responses and scale them to operational level
- management of pest and diseases has to be taken seriously by growers to avoid losses in productivity. Further work on quantifying potential economic damage and on genetic improvement will be necessary to obtain pest resistant plants;
- it is of utmost importance to have a good monitoring plan which helps not only to know the dynamics of growth and yield but
- to follow the correct and timely application of silvicultural operations to meet the desired management goals. The establishment of permanent plot networks and measuring additional variables is needed to get more precise information in order to be able to predict growth and yield, and especially on quality issues such as stem form and defects that may affect merchantable volumes

The following trends are observed:

- Timber from fast growing plantation appears to have physical/mechanical properties as good as of those of timber from old-growth plantations. However, perception and decorative issues can be a barrier to penetrate the market of natural forests teak. Thus, although it is unlikely that teak from fast-grown, short rotation plantations reach the average prices of old-growth teak, its market will continue to expand in the near future;
- private companies and small producers in Latin America favor the use of wider spacing, earlier and more intense thinning, and shorter rotation ages (15-20 years), owed to the prevailing high interest rates for plantation projects, as well as the need of income from the final harvest as early as possible. Improved material and adequate silvicultural practices are mandatory for such purposes
- sustainability and environmental services (e.g., carbon sequestration) are an increasing concern in forest plantation management. The use of the best silvicultural practices in every stage to reach sustainability goals can help to guarantee sustainability

- adoption of modern concepts and techniques of intensive and sustainable forest management (e.g., precision forestry, nutrient dynamics, and informatics including advanced remote sensing techniques, optimization, and simulation models).

The following are tentative policies that global and national institutions could adopt or reinforce:

- Develop mechanisms to make planting teak an activity that is attractive both for tree growers and for investors;
- promote the exchange of information on the establishment and management of teak plantations around the world
- develop globally uniform grading teak rules for timber from plantations. Standardise and divulgate conversion factors to estimate and predict future commercial yield of specific products from standing volume estimations.
- favour initiatives and search for funding to propose and execute international projects for studying the performance of improved genetic material under a wide set of site conditions;
- to reduce negative perception by people in relation to teak plantations;
- work to reduce negative perception by people in relation to teak plantations
- inform and facilitate the access to improved genetic material, especially for small holders
- evaluate the impact of regulations in the process of establishment, management, and commercialisation of teak plantations;
- devise policies to allow the growers obtain added value for their products or further benefits in the value chain
- develop mechanisms of participation and benefits from teak plantations of stakeholders such as communities and workers;
- favour the creation or reinforcement of institutions for providing small producers with technical support for establishment
- and management of teak plantations.
- stimulate the incorporation of teak plantations under sustainable management schemes; analyse impacts of certification issues in enhancing sustainability of teak forest plantations;

Wood Quality for Advanced Uses of Teak from Natural and Planted Forests:-

Teak is preferred for its high quality timber owing to its moderate density and strength, high dimensional stability, high durability and ornamental wood figure. The key wood characteristics are linked to the heartwood formation. Considering the declining supply from natural forests,
the long-term prospects of short rotation plantation grown teak seem promising, and the following factors are considered relevant in terms of end-use.

- The wood properties such as colour, grain, texture, wood density etc. of teak from young plantations are slightly different and fetch lower prices in the market than the naturally grown teak or plantations of 50-60 years.
- Enough evidence is available from different parts of the world to show that plantation-grown small dimension teak is not inferior to natural teak of the same age in terms of density, strength and shrinkage
- After log geometry and knottiness considerations, profitability is substantially influenced by the proportion of sapwood
- The colour of heartwood is an important wood characteristic for commercial products and can be controlled by a suitable genetic selection
- Heartwood percentage increased with growth rate of trees with increasing DBH and the effect of growth rate on the heartwood-sapwood ratio seemed to decline with age. Consequently, it is possible to produce large diameter logs with greater proportion of durable heartwood per tree by accelerating tree growth through silvicultural interventions in short rotation plantations.
- Higher natural durability and stability of teakwood is reflected in higher extractive content. Fast-grown teak is generally less durable than mature teak due to a lower amount of extractives.

  By adopting simple colorimetric methods and extractive content assessment (e.g. through NIRS), durability can be assessed for plantation teak at young age.
- In order to obtain highly durable teakwood for special products and for external applications, it is advisable to retain the teak trees for longer rotations of 50-60
- years or more, disregarding short-term investments and benefits. Genetic improvement may overcome the need for long rotation since the variability in extractive content could be controlled through judicious selection strategies.
- A combination of appropriate site selection coupled with good germplasm material and by adopting the right silvicultural practices could increase the yield to 8-10 m3/ha/yr that will be realistic on a short rotation of 20 years for better economic returns.
- Teak exhibits wide variations in wood quality traits and within-tree variations are greater, rather than between populations; this characteristic of within tree variations has to be taken into consideration for tree improvement.
- Existing grading systems for teak timber need to be reviewed and changed as necessary, taking into consideration the quality and dimensions obtainable from plantations as well as from natural forests
- Standardised internationally accepted log grading rules and volume measurements should be followed for the trading and marketing of teakwood.
- Matching the provenances for specific site conditions (site matching) and product requirements appears to be most crucial in tree improvement programmes
- National and international agencies should strive to promote best practice in teak cultivation and management, especially to ensure the ability of small scale growers to manage wood lots sustainably, to access markets and to make profitable returns for their livelihoods

Project Report:-

1.The detailed bankable project report of the Product (Financials, space/ Manpower requirement, Technology, Quality requirements, etc):-

A) LISTOFCHAPTERS

B) LISTOFANNEXURES

THEPROJECTATAGLANCE

Sl.No.	Particulars	Description
A.ProjectDescription		
1.	ProposedProject	Teak fabricated round block Unit
2.	CapacityofthePlant/Unit (At100% Capacity)	▪ Teak fabricated round block 500 Cubic.ft ▪ Round table200, cubic .ft ▪ Chair 200cubic.ft ▪ Toy 100 Cubic.ft **Total: 1000 cubic Metre**
3.	Year-wiseCapacityUtilisation	Yr01 Yr02 Yr03 Yr04 Yr05 **50% 60% 70% 70% 70%**
B.ProjectCost		
1.	Land	Own Land/On Lease
2.	CivilWorks &Buildings	Rs. 5,00,000.00
3.	Plant &Machinery	Rs. 6,22,000.00
4.	FixedAssets	Rs. 2,09,000.00
5.	Pre-operativeExpenses	Rs. 2,11,000.00
6.	Contingency&Escalation	Rs. 67,000.00
7.	MarginforWorkingCapital	Rs. 2,36,000.00
Total		**Rs.18,45,000.00**
C.Meansof Finance		
1.	Equity@40%	Rs. 7,38,000.00
2.	Loan from Bank@60%	Rs.11,07,000.00
Total		**Rs.18,45,000.00**
D.FinancialBenchmarks		
1.	BreakEvenPoint(atOperating CapacityonThird Year)	**49.22%**
2.	AverageDSCR	**1:2.30**
3.	InternalRateofReturn	**18.00%**
E.BasicAssumptions		
1.	PowerRatePerUnit	**Rs.6.00/-PerUnit**
2.	InterestRate	**TermLoan: 8%; WCLoan: 12%**
3.	RepaymentPeriod	**6Yearsincludingmoratoriumperiodof 1Year.**

CHAPTER-
2INTRODUCTION

Adetailedanalysishas been carriedoutconsideringmainlythe aspectsbelow:

Marketand demand oftheproducts.

Requirementsofmiscellaneousassetsfortheproject.

Estimationofinstalledcapacityandoperationpattern.

Consumables,power &utilitiesandmanpowerrequirementsetc.

Estimationofthecostofthe project andworkingcapitalrequirements.

Meansof Finance

Estimationofcostof operation,profitabilityandfund flowstatementsetc.

ImplementationSchedule.

The total Project cost is estimated at **Rs. 18.45 Lakhs** which includes margin moneyforworkingcapital @ 25%.

The various profitability estimates and other financial indicators worked out as giveninthefollowingpages areup to thesatisfaction level.

CHAPTER-
3PROJECTDESCRIPTION

The proposed project is that of setting up of a Teak fabricated round block unit at suitablelocation.

Thekeyproducts of theproposed project areas follows;

- Teak fabricated round
- Round table
- Chair
- Toy

Teak fabricated round blocks areusedalloverthecountryandtheunitcangoonaddingnewproductsonce achievestabilityin themarket.

The proposed project would procure the raw materials from the farm level availablelocally.Afterprocessing,theproductswouldbesuppliedtothemarketthroughdistributors/wholesalers/retailers.

CHAPTER-4

MARKETPROSPECT

Teak (*Tectona grandis*) is one of the world's premier hardwood timbers, rightly famous for its mellow color, fine grain and durability. It occurs naturally only in India, Myanmar, the Lao People's Democratic Republic and Thailand, and it is naturalized in Java, Indonesia, where it was probably introduced some 400 to 600 years ago (Troup 1921).

Indonesia has a long history of growing teak as an exotic plantation. The species is believed to be introduced the first time in 14th century by Hindus (Simatupang 2001). Currently Indonesia is one of the world's largest teak grower. Most of the plantations have been grown in Java, where the largest grower is Perum Pehutani (state-owned forest corporation) which manages over 1 million ha of teak-bearing plantation with a net area of teak estimated to be around 6,00 000 ha. Community-grown teak plantations have been becoming of importance in producing teak log, not only in Java, but also in eastern Indonesia such as South Sulawesi, South East Nusa Tenggara and East Nusa Tenggara.

The trend of teak planting by farmers has been continuously increasing in recent years due to decreasing the log supply from state forest managed by Perhutani while the demand of teak-log is steadily increasing.

Teak log harvested from community-teak plantation has been stated to have low quality and consequently low price as well due to be harvested at much younger ages around 15-20 years compared with that of traditionally known of teak log from the state forest harvested at least at 40 years old. However, complete information on the productivity, log quality, wood properties and processing of teak log harvesting from community-grown teak plantations in Indonesia is still lacking. The present study is intended to gather this information with a particular reference to Java and eastern Indonesia which have a large size of community teak plantations.

The field surveys also collected information on a wide range of log dimensions and qualities at selling time harvested from short-rotation community teak plantations. During field surveys interviews with teak growers and processors were also conducted.

An extensive literature search was carried out in order to collate all sources of data and information related to community-teak grown plantations and teak log utilization harvested from the community teak plantations India constitutes some 75% of the global trade in teak, followed by Thailand, China and Vietnam. Myanmar is the largest supplier to all of these markets; a supply maintained through harvesting ofnative forests. A large number of teak growers in countries of Central and South America, Africa andAsia make up the remainder of the trade, all based upon plantation-grown resource. Using acombination of data sourced from the Global Trade Atlas, the Indian Directorate General ofCommercial Intelligence and Statistics (DGCIS) and the databases of Chinese, Vietnamese, Thai andLao Customs, pricing and patterns of trade flows for these four major importing countries and LaoPDR and other suppliers have been established, quantified and trading partnerships identified.Constraints to efficient market linkages were identified. For example, the global trade of teak isfrustrated by a lack of standards and consistency in establishing prices for teak logs. Lack of information and misinformation results in widespread uncertainty and confusion around teakinvestments, particularly in relation to prices. Another source of misunderstanding in the teak tradeis the confusion between log volume measurements using Hoppus and Brereton scaling. Someproducer countries use one method for calculating log volumes and dimensions and apurchasing country (e.g. India) may use Hoppus as their standard. . Stakeholders must be equippedwith credible conversion factors to move between the two systems if they are to avoidmisunderstanding and strengthen market links. Other emerging considerations influencing trade efficiency include certification and legality of logs and supply chains. .

Teak is widely sought-after in furniture industries, some of which are not influenced by such issues whereas others are sensitive to the demands of legality and certification. It appears that these requirementsmeaningfully influence growers and processors, especially those who are dependent upon tertiary markets in North America and Europe. Some markets are influenced by differential tariffs applied to the import of round logs and sawn timber; some are influenced by the need to trade in containers or as break-bulk consignments.

Lao PDR has an estimated resource of 40 000 ha of plantation teak, 26 000 ha of which is grown by Small holders in the north. This resource is maturing and becoming of commercial interest to wood industries within Lao PDR and its neighbours China, Vietnam and Thailand and the more distant markets of India.

To make best use of their resource, Lao stakeholders must be familiar with the broader international markets, both in regards to demand and access requirements, as part ofdecision making processes. Without knowledge of market drivers, prices and trends, policy makers,managers and smallholder growers are at a disadvantage. Conclusions are reached regarding thenature of the existing and potential demands of the wider global market place and specifically fromChina, Vietnam and Thailand. The likely influences of these demands upon the maturing resource ofteaks grown in Lao PDR are addressed.

Concluding Recommendations:_

The report presents two main recommendations:

1. **For governments in countries with laws regulating the import of illegal wood:**This report finds that the majority of the potentially high risk species were listed in products exported under HS code 4421, which is outside the scope of many timber import regulations including the EU Timber Regulation, the Australian Illegal Logging Prohibition Act and the Japanese Clean Wood Act. In the case of the Republic of Korea, all wooden furniture products and HS codes as well as "other articles of wood" under HS code 4421, are currently outside the scope of products covered by the Korean Revised Act on the Sustainable Use of Timbers.

As such, we recommend that the European Commission and the governments of Australia, Japan and the Republic of Korea broaden the scope of the products covered by their regulations to include all wooden furniture HS codes and "other articles of wood' under HS code 4421. Any government in countries currently designing regulations seeking to eradicate illegally logged timber from their markets should ensure that these products fall within the scope.

2. **For the Government of India:**Given that India's timber product exports are already vulnerable in regulated markets, and many furniture and handicraft artisans are likely to see increasing demands to verify that the timber they use is legal, **we recommend that the Government of India develops a robust import regulation specifically designed to exclude the import of wood products that are harvested and traded in violation of the laws and regulations in the source country.**

FURTHER RESEARCH

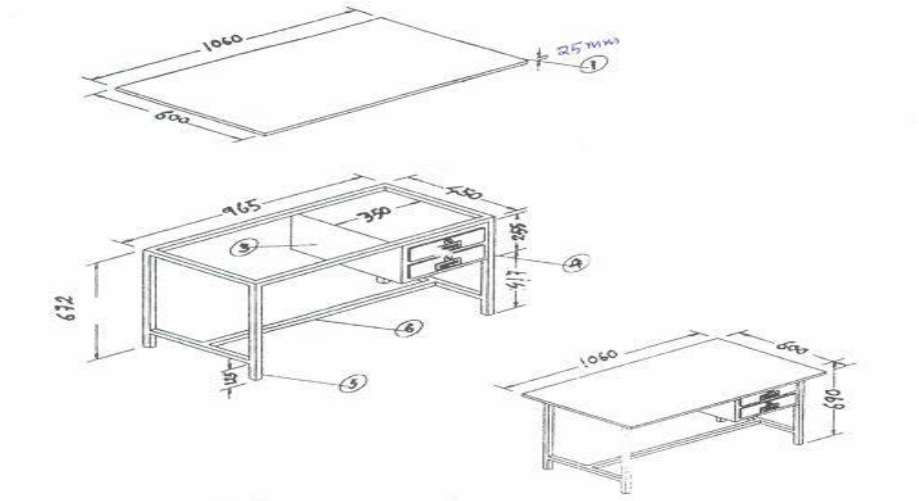
This report presents a desk-based review of existing information on India's supply (production and imports), and demand (both international and domestic), as well as information on India's wooden furniture and handicraft industry. This study has been designed to summarize existing data and information as well as to identify research questions for a second, field study that will focus on furniture hubs supplying key regulated markets like the United States and the EU+EFTA. In light of the findings in this report, it is recommended that the in-country study focuses on four "hubs". These could include:

1. Jodhpur, in Rajasthan, which now has a strong presence in international wooden furniture markets. More than 50 percent of India's furniture exports to the United States and the EU+EFTA countries in 2019 came from Jodhpur.
2 Delhi (accounting for 18 percent of exports of furniture under HS code 940360 to the United States in 2019, although only 3 percent were to EU+EFTA countries). Delhi is also a hub for agents within India who are responsible for linking imported timber with producers and selling furniture to international buyers
3. Jaipur/Sikar (accounting for 12 percent of exports of furniture under HS code 940360 to the United States and 24 percent of exports to the EU+EFTA in 2019). Jaipur and Sikar in Rajasthan were key centers for production of other wooden furniture using sheesham (Dalbergia sisso) and accounted for 60 percent of India's exports of sheesham furniture under HS code 940360 to the United States in 2019. All the exports originating from Sikar reported sheesham as the main furniture component.
4. Mumbai or Bangalore, only accounting for 1 percent of India's 2019 exports of wooden furniture under HS code 940360 to the United States and 0.6 percent of exports to EU+EFTA countries, but were most likely to export teak furniture. Mumbai produced the most teak furniture exported to the United States in 2019, accounting for around one-third of all India's other wooden furniture exports to the United States that specified "teak". More than 60 percent of the furniture produced in Bangalore and exported to the United States included teak. The other 40 percent of exports did not include any species information.

Key questions for the in-country study include:

- What is the 2020 overall supply (domestic supply plus imports) and demand (domestic demand plus exports)?
- What is the forecast for domestic production in the next 10 years?
- What are the legality risks associated with timber harvested in India?
- How does this vary across the regions/states?
- What are the main overland trade routes, border points, quantities, and actors involved? Through interviews with traders in India, to what extent is the overland illegal timber trade between Myanmar and India a significant risk?
- Which manufacturing centers are using raw materials sourced from Myanmar and other high risk countries? What products are being produced? Who are the ultimate consumers of these products?
- What is the structure of the furniture industry, and how is this changing? Are SMEs still purchasing imported timber through agents in Delhi and other major centers?
- What are the preferences for Indian consumers?
- How often is teak being used in furniture production? How often is teak furniture exported to the United States and to Europe?
- What proportion of exported furniture and handicraft products are using reclaimed wood? Where and how is reclaimed wood produced?
- What are the Government and/or industry attitudes and plans for introducing robust import restrictions designed to exclude the import of wood products that are being harvested and traded in violation of the laws and regulations in the source country?

OFFICE TABLE
SPN NO..:- SF19E0006
OVEERALL SIZE : (L)1060 X (W) 600 (H) 690 mm.



MATERIAL DETAILS:-
12. TABLE TOP: - 25mm THK. ISI Marked Pre Laminated MDF Board IS-14587-1998. with upto date amendment
2. LIPPING :- Teak wood half round 25mm wide.
3. DRAWER BOX :- CR sheet 0.80mm thick Confirming to IS-513 size CUBOARD 450(D)x350(W)x255mm(H).
4 DRAWER SIZE :- 400(L)X80mm(D) Minimum.
5. FRAME & :- ERW Square pipe 25x25x1.25mm in size STRUCTRUE 965(L)x450(W)x670(H)mm
6. FOOT REST :- ERW square pipe 25x25x1.25mm in full length.
7. Also refer “General Requirements.”

Wood processing in the surveyed areas

Twenty five industries were visited and surveyed during the study. It is noted that the majority of industries found in Gunung Kidul had sawmill. Mostly they employed air drying technique to dry the wood. Some of them used heater, but no kiln dryer found in the district (Table 21). From 25 processors surveyed, there were 19 companies who broke down teak logs into sawn wood by themselves. The remaining 6 companies might ask for help to other companies or the third parties to break down their logs. It was found 11 companies who dried their sawn wood using the oldest technique of wood drying, namely air drying. Some companies (5 industries) have been studying how to improve the drying technique by heating the wood with hot air circulated in a chamber. The heat was obtained from burning the wood waste in the mill. The other form of heating is warm water to be circulated around the wood chamber.

The need for wood processing improvement

The current teak wood processing observed in the small sized industries is mostly considered traditional, less efficient and using simple and often traditional tools for wood processing. There are a wide range of opportunities to improve the current wood processing to achieve the high quality of teak wood products. The following areas in wood processing are suggested:

1. The sawing technique.- The technique employed should consider the log quality and the price of sawn timber. This combination factor will generate high revenue of sawmilling. The current sawing technique is mainly tangential lumber type sawing. This sawing method does not consider the log quality or log defects along the stem. Consequently, the lumber quality and its yield are not predictable.

2. Sawing machine. - The proper use of sawing machine and type of saw blade should be employed in the sawing system. By doing so the recovery rate can be increased significantly and the waste percentage can be minimized.

3. Drying technique.- The proper drying technique should be introduced to the community wood industry. The setting up location of air drying with wood piling above the ground and covered by roof would minimize the effect of high humidity of soil and high humidity of air during night. Since wood is hygroscopic material, then it could attract moisture from the air and soil easily. The current air drying conducted by rural people or community wood processors is merely vertical arrangements of teak lumbers in rows in an open area without roof or only laying the lumbers in a declining position. The base lumber directly touches the soil. This technique of wood drying produces wide variabilities in the moisture content of wood and longer time to reach a certain moisture content. A relatively modern wood drying such as heating the wood piling to a certain temperature is an effort to reduce the drying time and smaller variations of the moisture content. This system seems to do well and requires small investment to build, but the drying defect is relatively high. Hot water drying system needs a bit high capital to set up the machine, however it will produce uniform moisture content and lesser drying defects.

4. The improvement of color appearance of sapwood.- The light color of teak sapwood, which is whiter than the heartwood should be reduced as much as possible for increasing the teak wood value. One of the known methods to make this sapwood portion do not appear is to change its color to the similar color of heartwood. This could be done by heating the wood. The heat treatment has shown a good promise to reduce the heterogeneity of wood color, meaning the color differences between heartwood and sapwood become less.

5. More efficient use of logs.- All teak logs procured from community teak plantations should be processed into useful products. This can be done by reconstituting the waste to become an acceptable dimension of wood products. A small dimension of log cut, log end, log with knots and end-splits, and other defects are glued together side by side to make lumber or beams. This lamination technique should be introduced to the small sized wood industry of the community.

6. Product diversification.- Moving the conventional and commercial products of furniture to the high products of housing components such as beam, truss, window frames and other items will increase the revenue of the community teak wood processors.

Products and end users:-

Teak has long been acknowledged for its excellent wood properties, making it one of the mostsought-after multi-purpose timbers in the world. These properties, particularly for heartwood,include strength with lightness; durability; dimensional stability (due to a very low coefficient ofexpansion and contraction); non-corroding properties; ease of working and seasoning; termite, fungus, chemical, water and weather resistance and attractiveness (Keogh, 2009). The versatility ofteak makes it suitability for a broad array of end-uses that are well documented - the best qualitybeing used for high value furniture and boat decking and the smaller sizes used as a cheaper, utilitytimber. Specifically, where there is high humidity teak is ideal because it does not warp, twist or expandand its natural oils and resins (technoquinines) repel water and reduce insect or fungal attack. The
dominant uses are in the furniture, doors and windows sectors (Somaiya, 2013).

Global furniture industry

The world's top producers of furniture are China, USA, Italy, Germany, India, Japan, France and Poland whilst the world's top exporters are China, Germany, Italy, Poland, USA and Vietnam. China remains both the world's largest producer and exporter (CSIL, 2013). The furniture industry has expanded along with the recovery and expansion of the global economy since the financial crises of 2008. In 2012, global furniture production continued to recover and was valued at $370 billion in 2011 and by 2015, the global furniture market is expected to reach $436.5 billion. The value of global furniture trade in 2011 was $109 billion. The United States is the largest furniture-importing country, with imports valued at $12.4 billion in 2011 (United Nations, 2012).

There is a strong relationship between housing and furniture: housing has been a leading indicator of economic recovery; a house purchase being a discretionary expenditure and sensitive to interest rates. Lower interest rates are usually effective in stimulating demand for new houses. When people buy new houses they also tend to buy new furniture and other objects for their house.
Wood furniture is a sub-set of the broader international trade in furniture and production/export patterns generally follow the broader furniture pattern. The largest importers of wooden furniture are the markets in Europe and North America (Figure 3), both of which are becoming increasingly sensitive to the needs of legality and certification in wood trade

Factors influencing Global Teak trade and prices:-

Apart from the common suite of challenges to all international trade such as fluctuating exchange rates, government regulations and changing tax regimes and tariffs there are several other considerations which influence efficient global trade in teak.

Standards.

A lack of standards and consistency in establishing prices for teak logs has been a longstanding and common theme of discussions of international teak markets. Several expert observers have reflected upon this issue. It was observed " *…due to lack of standards, lack of information and misinformation there is widespread uncertainty and confusion around teak investments, particularly in relation to prices"* and suggested the establishment of an international pricing mechanism for teak, designed to provide standard, transparent, widely published and up-to date information on plantation teak prices.
It also reflected that "*…it is difficult to get accurate and regular wholesale and export prices for teak wood*". The concurred with these sentiments, observing "*The creation of uniform international log grades for plantation teak, along with standardized lumber and product grades would be of great help to improving the marketability of teak wood products. Standardized descriptions are needed so that buyers know the exact quality of the products being offered for sale*". Kollert (2013) reflected upon this theme in reporting FAO's detailed 2010 study on teak "*….the 2010 survey of teak prices proved to be particularly difficult. Firstly, there are no common international log grading rules established and the perception by the countries of a small size and big size logs proved to be rather different*".

Measurement of log volumes

There is no single internationally-accepted method for measuring logs which can allow reliable comparison of prices between countries. Log volumes can be calculated in several ways, each offering a legitimate (but different) result. What the grower produces in real cubic metres may not be the same volume which is traded. This can be a source of considerable misunderstanding andconfusion - a grower wants to be paid for wood grown and the trader wants to pay only for wood which can be processed.
Conversion factors have been developed to assist this important dialogue but are yet to be uniformly applied FAO (2010) offers a practical example of the importance of adopting agreed conversion factors:
A practical example would be a timber sale appraisal that a saw-mill is conducting to determine a bid price. The stand volume may be reported in cubic metres over bark but the purchaser may need to convert these volumes into inside bark volumes, weight or board feet3to match their units of measure. To determine the value of the timber, the purchaser will need to know the cost of getting the timber from the stump to the mill site, thus weight to volume ratios are likely to be an important parameter for determining weight-basedtransport costs. Primary product recovery will need to be estimated using conversion factors from round wood to the primary product, e.g., 2 m3 round wood will produce 1 m3 sawn wood. A material balance will be used to determine the quantity and thus value of the residual products made, and finally, ratios may be used to estimate the quantity of unmeasured

Some producer countries may use one method for calculating log volumes and dimensions and a purchasing country may use another as their standard. For example, producer countries in West Africa use the Brereton scale for calculating volume whereas in India (the world's largest teak market) the Hoppus system is used. A standard 20' container can hold up to 15 m3 (real volume) of small logs, but this may convert to about 13 m3 if the Hoppus system is applied and this can cause considerable confusion. There is an acknowledged need for producers and buyers to agree on a common form of log measurement or standardise allowances or agree on standard conversion factors to convert volume to true cubic volume.

Logistics and trade

The fragmented nature of the global teak estate across continents, countries and landholdings offerslogistical challenges to the efficient sale of teak grown in plantations. Trades of teak logs may beshipped as break bulk cargoes, in containers or, where conditions permit, by truck. The commercialattractiveness of a planted teak resource is strongly influenced by the proximity to a suitable port,adequate road transport and infrastructure and sympathetic government regulations and servicesrelated to export procedures (such as tax, customs and quarantine clearance). Internationalshipments of teak require an understanding of concepts of global shipping includingcontainerisation, intermodal transport, non-vessel operating carriers and freight forwarders

Containers

Standard 20- and 40-foot shipping containers are becoming an increasingly common part of shipping for teak consignments. They offer efficiency for loading and unloading and transfer of cargo to other forms of transportation such as rail or truck plus a faster and more reliable delivery and logs arrive in better condition (Somaiya, 2013). However, containers do have limitations and cargoes are limited by dimensions and maximum weight limits (Table 2). Typically, a 20' container (TEU) can hold up to 15m3 of teak logs up to 5.8 metre length (13m3 Hoppus) or up to 19 m3 of sawn timber or squared logs (up to a maximum weight of 22 tonnes). A 40' container (FEU) can hold about 22 m3 logs, generally cut to 3.9 metre lengths or sawn timber up to a maximum weight of 26 tonnes.

In addition to the costs of ocean freight, containerised shipments need to meet charges for BAF (Bunker Adjustment Factor), ICS (International Carrier Surcharge) and port charges such as MSA (Maritime Service Authority), TDC (Terminal Destination Charge) and a series of agents' fees. Shipping costs for consignments of teak round and squared logs in 20' containers between the Solomon Islands and ports in China, Vietnam and India are of the order US$84 – 112/m3 and a Break-down of these costs is offered in Table 2:-**Standard dimensions of shipping containers:-**

Container size	Inside length (m)	Inside width (m)	Inside height (m)	Door width (m)	Door height (m)	Capacity (m^3)	Tare weight (kg)	Maximum cargo (kg)
Standard 20'	5.89	2.33	2.38	2.33	2.28	33	2230	21700
Standard 40'	12.01	2.33	2.38	2.33	2.28	68	3701	26780

Teak wood prices are generally determined based on subjective (generally experienced) visual assessment of logs. There is no commonly accepted, systematic or consistent international grading rules with corresponding price values. An example of the many factors considered for calculating values of plantation-grown teak logs are combined in a draft set of Log Grading Rules established for the Solomon Islands.

International regulations, legality and certification:-

The global wood markets have become increasingly sensitive to timber sourced illegally or unsustainably, with consumer companies applying voluntary verification (sustainability) standards and/or governments introducing involuntary regulatory (legality) compliance systems that influence market access and acceptance.
There is now increased focus within trade and aid policies to encourage developing countries to adopt higher levels of sustainability in forest management approaches and reduce incidences of illegal trade in forest products. It is now apparent that the major change occurring within international markets is that a demonstration of sustainability is no longer a primary requirement to access markets; management and governance systems must now demonstrate a commitment to legality of product and transparency of supply.

The large markets of North America and Europe have responded legislatively, building on the principles of certification and associated sustainability and environmentally responsible production.

The global resource and trade in teak:-

The global teak plantation resource of 6.8M ha is geographically spread across the seasonally dry tropics and is mostly less than 20 years of age. As a popular plantation species, new plantations continue to be established and the area planted to teak is expanding. Although the annual wood increment of global plantations is currently about 30M m3, only 2.0 – 2.5 M m3 are harvested annually and this can be expected to increase as the resource matures.

Industry sources suggest thatthe mature plantation resources of West Africa are likely to decline as plantations have not beenreplaced and that the plantations of Central and South America are reaching maturity and supply from this region will continue to expand. In addition, some of India's 2.5 M ha of plantations,previously unavailable for commercial utilisation, may be made available to meet India's domesticdemand if Government of India policies change.
An analysis of data available to this study indicates that some 1.3M m3 teak logs and sawn wood arecurrently being traded annually; a global trade worth an estimated US$723 million. The datademonstrates the importance of domestic processing which accounts for the remaining 1.2M m3 ofharvested wood which is processed in the country of origin. The data firmly suggest that global tradeis expanding and grew by 47% by volume and 58% by value between 2010 – 2012. "Burmese teak"sets international standards for quality and Myanmar is the world's largest supplier of teak logs andsawn wood, with exports growing by 50% between 2010 and 2012 and valued at $409 million in2012. However, any future analysis of teak availability in global markets must account for a dramaticreduction in teak supply from Myanmar following implementation of its proposed log export bans
and forest trade reforms scheduled to commence in April, 2014.

Importers of teak:-

There are four major importers of teak; India, Thailand, China and Vietnam. Of these, India andThailand have protected resources of native teak and both are growers of plantation teak andexporters of teak products. India is the world's largest market for plantation teak, representing some 75% of global trade. India'simports are expanding and have grown by 54% since 2010 with a marked increase in trade withCentral/South America accounting for a large part of this increase. The increase in demand has beenfuelled domestically by an expansion in the real estate market and a boom in construction ofresidential housing where teak is the preferred timber, particularly for doors and windows whichaccount for some 40% of teak processed. Indian wooden furniture manufacture for domesticconsumption and export is growing steadily with exports reaching $592 million in 2012. This sector issignificant user of teak. An Indian policy response to the proposed log export ban from Myanmarmay be to allow greater access to Government-managed teak plantations in India.

Whilst having an impact upon Indian domestic supply, this is not expected to have a large impact upon trade from countries other than Myanmar. India's import preference is for round or squared logs (rather than sawn wood) which takes advantage of India's low costs of processing and attractively low tariffs for round logs and squared. India remains the leading global importer of teak round logs and squared logs, China shows a strong demand for sawn timber.
Although China is the world's largest importer of wood and exporter of wooden furniture (US$17.5 billion in 2012), imports of teak logs to China are only 10% of those imported by India. Chineseimports of teak logs and sawn timber are expanding. In contrast to India where teak is used forbuildings and doors/windows, in China the use of teak is dominated by manufacture of woodfurniture for exports. Chinese processors of export furniture are becoming increasingly sensitive tothe need to demonstrate use of legally-sourced wood.
Thailand is a grower of native and plantation teak and both an importer of teak logs and sawn wood and an exporter of finished and semi-finished teak products. The country has mature, sophisticatedwood processing industries which have a heavy reliance upon Myanmar, particularly for supply ofhigh quality teak from native forests. As in China and India, the proposed log export ban and policyreforms in Myanmar are likely to have a very large impact upon wood supply and industry output.This may result in an increase in illegally sourced high quality timber from neighbouring countries ora shift to utilisation of plantation grown timbers from both domestic and imported sources.

Vietnam has a vibrant, sophisticated and modern, export-oriented wood furniture industry which is dependent upon imported logs and timber. Despite the size of the industry, there has been areduction in imports of teak logs and sawn timber. A possible explanation shared by processors hasbeen the challenges experienced in obtaining legally certified supplies of teak to service industrydemand. In contrast, supplies of competing plantation grown acacia and rubber have been in readysupply.

Influences in the global teak trade:-

There are a wide range of factors which influence global trade of teak, apart from the normalchallenges of international trade such as exchange rates, changing trade policies and regulatoryrequirements, taxes and tariffs.
The global trade is teak is frustrated by a lack of standards and consistency in establishing prices forteak logs. Despite a considerable international dialogue, the lack of standards, lack of informationand misinformation results in widespread uncertainty and confusion around teak investments,particularly in relation to prices. There is a rationale for provision of standard, transparent, up-to-dateinformation on plantation teak prices.
A potential source of misunderstanding in the teak trade is the confusion between methods ofcalculating log volume. Some producer countries one method for calculating log volumes anddimensions (e.g. Brereton) and a purchasing country (India) may use Hoppus as their standard.

Theentire industry supply chain in India is based upon Hoppus measurement and growers and suppliers who see engagement with the Indian market must be equipped with reliable standards andconversion factors to move between the two systems
Global wood markets are becoming increasingly sensitive to timber sourced illegally or unsustainablyand the large markets of North America and Europe have responded legislatively through specifyingprescriptive compliance measures. Confidential discussions with wood processors and wood productexporters in China, Vietnam, Lao PDR and Thailand indicate that importers have a strong preferencefor imported wood which is clearly legal and, in some cases, certified. The ongoing competitivenessof the large Vietnamese wood furniture sector will depend upon compliance with legalityrequirements. Much of the export furniture market from Thailand and India are based upon teakand are heavily dependent upon the discerning markets of Europe and North America. This is achallenge which growers and processors of teak will need to address as a matter of urgency.Indonesia has completed domestic regulations to comply with a VPA with the EU and Vietnam is to follow suit. Although designed for the EU markets, the conditions of a functioning VPA will meet the requirements for export to the USA

Opportunities and challenges for Lao teak in global markets:-

The Lao plantation teak resource of 40 000 ha is located largely in the north, small and highlyfragmented and almost entirely aged less than 20 years. As transport infrastructure improves andthe resource matures, its proximity to major global markets of Thailand, China and Vietnam (and to alesser account, India), will make it attractive for these markets. There have been reports (supportedby Indian import data) that consignments of Lao teak squared logs to Thailand have been shipped toIndia. The burgeoning Indian industry offers possibilities to the Lao growers
The global furniture markets are very competitive and furniture manufacturers are extremely price sensitive.

Small-sized teak from Lao PDR must compete with other tropical hardwoods such as acaciaand rubber wood and commonly traded temperate hardwoods.
The teak available from Lao PDR isnot differentiated from other small-sized plantation teak available from other sources in Asia,Central America and Africa and will have to compete to establish and maintain market share. Tocompete in the international markets, those trading in Lao teak will need to differentiate Lao teak ina positive way through:

- Price and quality (including efficient logistics)
- Selling in standardised form as round or squared logs and in standard sawn wood dimensions required by the markets
- Efficiency and ease of doing business through a sympathetic legal and regulatory environment
- Clear GoL processes to establish legality to meet EUTR and Lacey Act requirements
- Reliability and capacity of growers to assemble commercial consignments
- Responsiveness to the needs of buyers.

The fragmentation of the resource across many thousands of smallholders makes it challenging toassemble consignments of commercial size which meet market requirements of legality. Given thepoverty which characterises many of the teak growing communities in Lao PDR, it is likely thatconsignments will continue to be of small sized timbers as growers seek early financial returnsthrough early harvest. Recognising both of these issues, the GoL has encouraged the establishmentof growers' groups and adoption of processes to demonstrate legality and an informal dialogue hascommenced with EU partners regarding a VPA.There is an urgent need to complete an inventory of teak plantings in Lao PDR as the basis forplanning efficient marketing programs. Once industry has basic information on location and agestructure, commercial decisions can be made, consolidation can begin and contact made withreliable markets.

Traders provide a vital link between Lao PDR and the global markets and assume much of the riskentailed in making successful international trades. Locally, they will play a vital role in organisingcollection from smallholders to offer a consistent supply of quantity and quality to buyers. Thoseinvolved in the development of the Lao teak trade may care to moderate an obvious prejudice onthe part of some against traders and middlemen; they are a necessary part of the value chain.If Lao PDR continues to encourage Chain of Custody for its forest industry and Group Certification forits smallholder teak resource , and commits resources to gaining certification for its teak resourcesand processing facilities, then it is logical that marketing efforts be strengthened in countries whichhave a need for certified timber. For example, although India represents 75% of global markets, itsdominant domestic market is not sensitive to the additional costs of certification.

Vietnam, however,has a world class wood furniture industry which is 90% directed towards exports; these exportsprimarily to the markets of the EU and USA. Similarly, the Chinese and Thai furniture industries are export-oriented and have an obvious interest in both legality and certification. Certification will offeruncertain rewards unless reliable and regular buyers are located in these countries with acommitment to certification and legality. It is important that the costs and benefits of verificationand certification programs are assessed fully to ensure that they are cost-effective for the growers.

The Lao resource of planted teak, a high value, smallholder-grown, tropical hardwood, clearly offersattractive investment possibilities for local processing rather than export as low-value 'squared' logsto other countries. Knowledge of international markets will offer Lao growers and processors anopportunity to achieve efficiencies and refinements such as focussed marketing, assured legality andan improved regulatory environment and make appropriate adjustments to the supply chain tosuccessfully compete in markets for planted teak

Sustainability:-

Green Furniture Concept was born out of a deep desire to do good, take responsibility and always challenge ourselves and the industry to change for the better. We recognise the importance of considering the full life cycle of products, the materials used to make them and are always careful about the kind of chemicals used in our products. Our four sustainability cornerstones are: Chemical Awareness, Design and Resources, Reforestation and Post Sales Responsibility.

Chemical substances are everywhere in our lives. They might be the adhesive used to build our furniture, the dyes in our clothes or the salt on our food. Some chemicals are edible and safe, but others are toxic to humans, wildlife and the environment. The chemicals we use in production around the world are the chemicals we take

into our homes and put into the natural habitats of wildlife. It is up to us to decide what kind of chemicals we want in our lives and which we can do without.

We carefully assess the chemical substances used in our furniture to make sure the products we deliver are free from eco-toxins and harmful substances. We collaborate with our suppliers and environmental chemists to evaluate and continuously improve our chemical footprint. The Nordic Eco-label is the bottom line for our work to improve chemical contents and raise chemical awareness. Our vision and goal are to exclude all SIN-listed substances from our products.

Design & Resources

There are two kinds of resources on this planet, renewable and finite. With a growing global population and faster manufacturing processes, resource scarcity is here to stay. That is why renewable resources (materials like wood) need to be regenerated at the same rate they are used. At the same time, we need a circular approach to using and reusing finite resources (materials like metals). It is essential to understand and keep this in mind when designing and developing the future.

We design our products using renewable and recyclable materials and use the highest possible percentage of recycled and up-cycled content. We never stop trying to find new and better production methods and materials.* We use wood from certified sources to help protect biodiversity and maintain viable use of the world's forests.
We think reuse rather than buy new. We use hard-wax oil** instead of traditional wood varnish so that our furniture can be repainted and any scratches can be easily touched up instead of replacing complete parts. But just in case something does need to be replaced or recycled, we design our products to make sure parts can be disassembled individually to minimise waste and separate materials for recycling.

Reforestation

The forests of our world are beyond amazing. They are places of great bio-diversity, they protect river basins and give us oxygen while reducing carbon dioxide in the atmosphere. Without a doubt, trees are some of the best things on the planet – and we need more of them

As a manufacturing company, we do take and use resources but we try to do so responsibly. Our wood components come from certified sources to support and guarantee responsible forestry. We also plant a tree for every product sold, to close the biological cycle we start when the trees we use are cut down. We want to replant where it matters and the most bio-diverse and complex forests around the world are the tropical rainforests, which is why we choose to replant the majority of our trees in Colombia.

Plant a tree, grow the future

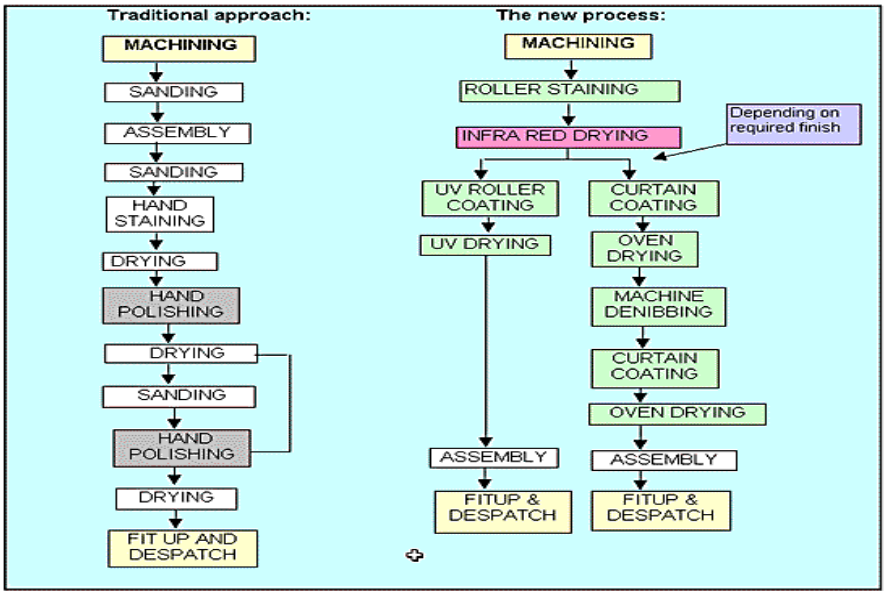
As the furniture industry joins the fight for a sustainable planet, the world's forests may be the only weapons we need. Forests are the lungs of the planet, providing oxygen while reducing carbon dioxide in the atmosphere. Woodlands are places of great biodiversity, protecting river basins and enabling wildlife to flourish. Sustainable forestry can even boost local economies, providing disenfranchised communities with the materials, jobs and resources they need to survive. Although many in our industry are taking a responsible approach, the deforestation associated with manufacturing is threatening the ecological balance. The consequences of deforestation are inspiring better management of wood materials, but few manufacturers are replenishing the resources they consume. That's why Green are replanting the trees we harvest to make our products, planting one tree for every metre of seating, and every Leaf Lamp, we produce. We established our first forest in 2008, planting 1,000 birch saplings near our production workshop in southern Sweden. Five years later, we established a second forest nearby, planting 500 cherry trees and 400 maples, then added another 1,000 birch saplings in 2016.

To be a truly sustainable furniture brand today, you need to have a strong commitment to raw materials at the deepest possible level.'**Joakim Lundgren, Head of Sustainability at Green.**
Today, Green is embarking on another groundbreaking initiative: we're planting trees in places where they matter most. *'Replanting the trees we use in production makes sure that we maintain a renewable resource,'* says Joakim Lundgren, Head of Sustainability at Green. *'But we're also committed to making sure that the global amount of forestry doesn't diminish, so we're looking for ways to increase it. This is why we've decided to plant a forest in Colombia, contributing to a project that protects river basins, encourages natural habitats and produces the life-giving oxygen needed to sustain them.'*

CHAPTER-5

TECHNOLOGICALPROCESS

Theprocess flow diagramis as follows:



(a)

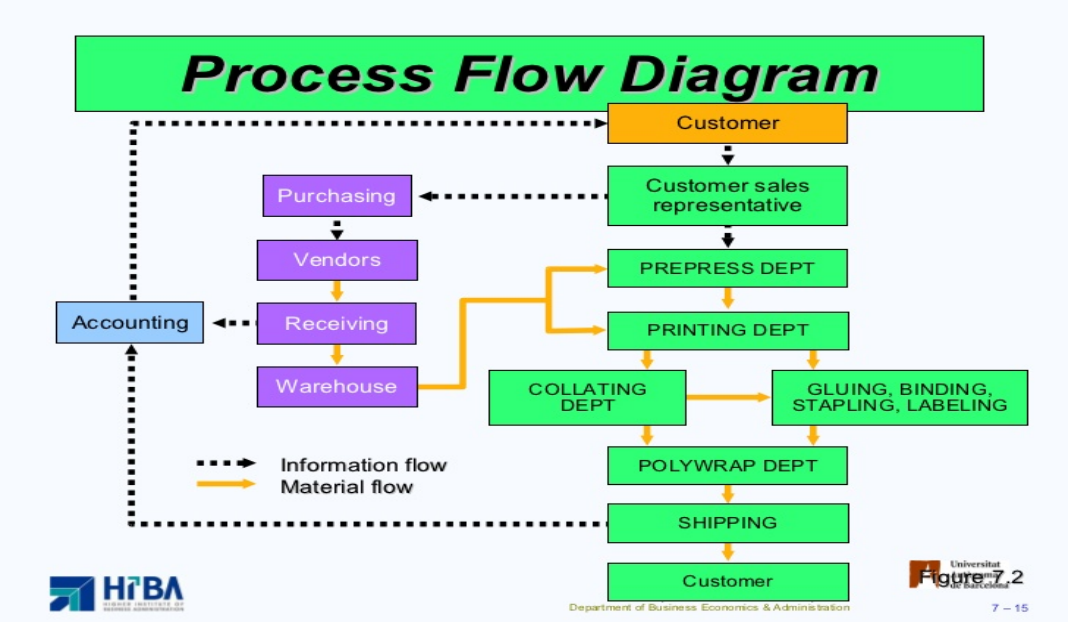


Figure 7.2

(b)

PROCESSDETAILS:

(i) Size of log:Firstofall,theTeak logs aresizes per shape of requirement of wood to be cut.

(ii) CuttingtoSmallPieces:Someteak woodrequirecuttingtosmallpieces. Such as saw milling and cutting as per size in the Mill.

(iii) Drying:Teak wood seasoning drying after the cutting size of the wood arespreadonthefloortoprovidesundrying.Attimes,mechanicaldryersare alsoused. Traytypedryerismost suitable.

(iv) Planning, cutting to shape and Grinding:teak are grindedindryform.

(v) Fixing:Afteralltheaboveoperations,variousTeaksfordifferentpurposesaremixed together.

(vi) Storage & Packaging:Attheend,spicespowderarepackagedinautomaticform,fillandsealingmachine.

(vii) TransportationandMarketing:Thereafter,theteak wood furniture productsaretransportedandsuppliedto the bulk purchasers.

CHAPTER-6

QUALITYCONTROLANDSTANDARDS

Following specifications under Bureau of Indian Standard related to processing ofsuchproducts maybereferred:

CED-35, ISO-TC-135:- Furniture and IS: 3731:1985, IS-14587-1998.

Teak fabricated round, Round Table, Chair, and Toy

POLLTUION CONTROL: There is no major pollution problem associated with thisproject in terms of air and sound pollution except for disposal of waste water whichwould be managed appropriately through recycling facility. However, entrepreneurshouldobtain NOC from concerned StatePollutionControl Board.

EFFLUENT DISPOSAL: Disposal of any effluent out of the project unit should betreated with recycling facility or dumped in such a way that these does not causehazard in the vicinityof thesite.

ENERGYCONSERVATION: Adequatecareshouldbetakeninelectricalinstallationsand optimalutilization of machinery.

CHAPTER-7

CONSUMABLES,POWERANDUTILITY

Themajorconsumables required areasfollows;

1. Teak fabricated round, round table, Chair,and Toy.

2. PackagingMaterialsincludingsecondarypackaging.

POWER:

The total requirement of power for the project is 16.92 KW. The total power supplywouldbedistributed in thefollowing way;

Plant &Machinery	-	**14.92KW**
GeneralLighting	-	**2.00KW**

Thedetailsrequirementis shownin **Appendix-C2.**

UTILITY:

WATER: Constant flow of water would be necessary in the operation of the plant.Water would be obtained from bore well and can be stored in an overhead tank, fromwhere it will be supplied to the required areas. Process water should be free of mudandsuspended particles

OTHERUTILITIES:Otherutilitiesincludefueletc.thoseshouldbelocallyavailable.Detail expenditureagainst the headis shown in**Appendix-C2**.

CHAPTER-8

INSTALLEDCAPACITY

Inassessingtheproposedplantcapacity,dueconsiderationhasbeengiventotechnologicalandfinancialfactors,marketingconsiderations,availabilityofconsumables,infrastructurefacilitiesandeconomicviability.Thedetailedrequirement of the plant and machineries to achieve the plant capacity is assessed bythe unit technician. While arriving at the requirement of various type ofequipmentandmachineryrequiredfortheunit,dueconsiderationshasbeengiventothefollowingpoints.

a) MinimumWastage
b) HighProductivity
c) Maximumflexibilityin operation
d) Adequate stock byprovision wherever necessary

The installed production capacity of the unit per annum is as follows;

Teak fabricated round		- 3000 cubic ft
	Round table	-400 cubic ft
	Chair	-400 cubic .ft
	Toy	-200 cubic ft
	Total	- 4000 cubic ft

For the purpose of carrying out this economic viability of the proposed project, it isassumed that the plant will operate at following efficiencies during the first 5(Five)years.

Year	**01**	**02**	**03**	**04**	**05**
Capacity Utilization	**50%**	**60%**	**70%**	**70%**	**70%**

CHAPTER-9

BASISANDPRESUMPTIONS

WhilederivingfiguresandprojectionsinthisProjectreport,followingBasisandPresumptionshavebeenmade.

The project is based ona single shift basis and300 days of working schedule in ayear,workingfor8 hoursaday, 25 daysamonth.

Theprojectcostandotherprojectionsetc.havebeenmadeonpresentmarketconditions and the sources available within our sources only and therefore it may varyonaccount of marketfluctuations and withdifferent suppliers andqualities.

The cost of machinery and equipment/materials indicated refer to a particular makeand the prices are approximate to these prevailing at the time of preparation of thisreport.
PowerrateisassumedatRs.6.00perunitandmonthlyfixedrentalcharges.
Waterwould bemadeavailable through bore wellfacilityattheproject site.
Manpower requirement for the project has been planned considering the size of theunit.

Interest rates considered is 8% on term loan and 12.00% on Working capital loan forfinancialassistance.
Forrepayment,aperiod of6 yearsis plannedwithmoratoriumperiodofoneyear.
Insurancechargeshavebeenconsidered LumpSum.
Repairandmaintenance havebeencalculatedatreasonably.

DepreciationshownhasbeencalculatedonStraight LineMethod.
Non-refundable deposits, Preparation of detailed project report fees, Architecture fees,travelling&Convenienceamount,Know-how&Engineeringfees,Applicationprocessingfees,trialproduction,feesetcareconsideredunderpre-operativeexpenses.

Break Even Point & Rate of Return is calculated on optimum production conditionfindings.

Attheplantsite,availabilityofunskilledlabourisnotaproblem.Skilledandunskilledlabourcanberecruitedforoperatingtheplant.Initialtrainingwillberequiredforsmoothandefficientrunningoftheplant.Itisfeltthattheskilledmanpower available locally having some experience in operation can be recruited tosatisfythe manpower need.

Project would be set up at a site that is well connected by road and there is adequatesupplyof power andwater.

CHAPTER-10

PROJECTCOSTESTIMATESANDMEANSOFFINANCE

TOTALPROJECT COST:

The Capital cost of the project has been estimated on the basis of installed capacityassuming 300 working days per annum. The total cost of the Project including marginfor working capital has been estimated at **Rs. 18, 45, 000.00** as detailed in **Annexure-A**.

LAND,BUILDINGANDCIVILWORKS:

TheapproximatecostofcivilworksincludingBuilding,Electrification,WaterSupply,Sanitation andDrainageetcwill be**Rs.5, 00, 000.00**.

PLANT&MACHINERY:

The total cost of Plant & Machinery has been estimated at**Rs.6, 22,000.00as** detailedin Appendix-A2.

PLANTEXPENDITURE:

ThetotalcostonPlantexpenditureincludesadmissibletaxes,transportation,insurance of the machineries and installation etc. has been included as detailed inAppendix-A2.

FIXEDASSET:

The cost of Misc. Fixed Assets has been estimated at around **Rs. 2, 09,000.00** asdetailed in Appendix-A3. These include cost of furniture and fixtures and officeequipment.

PRELIMINARY&PRE-OPERATIVEEXPENDITURE:

An expenditure of **Rs. 2, 11,000.00** has been earmarked on this account, as detailed inAppendix-A4.

CONTINGENCYANDESCALATION:

This has been calculated @ 5% on Civil Work, Plant & Machinery and Misc. FixedAssetstoprovidesafeguardagainstescalationofpricesorany otherunforeseenexpenditure.Thetotal amount works out to**Rs. 67,000.00**.

WORKINGCAPITALESTIMATES:

The detailsoftheWorking Capitalrequirementsof theproposedunithave beenshowninAnnexure-C.Inarrivingattheworkingcapitalestimates,variouscomponents vis Administrative Expenses/Consumables and Working Expenses havebeen taken on the basis of usual norms. The Working Capital requirement is proposedto be met from project margin money and cash credit loan borrowings from thefinancialinstitution.

MEANSOFFINANCE:

The Proposed Project Cost of **Rs. 18.45 Lakhs** would be financed under MSMEdevelopment schemes of financial institutions/commercial banks, in the followingmanneras shown below.

1. Term loan from Bank/ FI @60%	=	11.07 LAKHS
2. OWN PROMOTERSCONSTRIBUTION@40%	=	7.38 LAKHS
TOTAL	**=**	**18.45LAKHS**

DEBT-EQUITYRATIO:

Basedon theabovefinancingpattern, theDebt-Equityratio of theProject is**1.5:1**.

CHAPTER-11

ECONOMIC VIABILITYAND FINANCIALANALYSIS

COSTOFPRODUCTION:

Thecostofproductionhasbeenestimatedannuallyforthefirstfiveyearsofoperation. The various cost components taken into account are cost of administrativeexpenses, consumable stores, utilities, wages and salaries, repairs and maintenance,insurance, interest rates, taxes etc. depreciation. The detailed cost of production hasbeenshown in **Annexure-D**.

REPAIR&MAINTENANCE:

Cost under Repair and Maintenance expenses have been assessed by charging 1% onLand & Building, 2% on Machineries and 1.5% on Fixed Assets on first year withincreaseof 2%on subsequentyearsasdetailed inAppendix-D1.

ADMINISTRATIVEEXPENSES:

This has been considered in the cost and profitability statement under other expensesetc.

SELLINGEXPENSES:

This has been considered in the cost and profitability statement under other expensesetc.

DEPRECIATION:

In calculating the cost of operation, depreciation has been calculated under straightline method after absorbing the pre-operative and contingencies expenses as shown in**Appendix-D4**.

FINANCIALCHARGES:

The interest on proposed term loan amount of **Rs. 11.07 Lakhs** has been calculated**@8%**beingtherateofinterest.Theinterestcalculationforvariousyearsafterconsideringtherepayments dueinrespectiveyearshasbeenshownin **Appendix-D3**.

SALESREALISATION:

The total annual income of the Project is shown in **Appendix-D2**. Based on 70%capacity utilisation, total turnover is estimated at **Rs. 114.63 Lakhs on third year**, thesaleforotheryearsareestimatedatdifferentcapacityutilisationasshowninAppendix-D2.

NETPROFIT:

The proposed project is expected to generate profit from the first year of operationitselfand will graduallyincreasewith increaseincapacityutilisation.

INTERNALACCRUALS:

Thenetprofitaftertaxwithdepreciationaddedbackwouldmakeupsufficientinternal accruals to meet the term loan, working capital loan repayment obligationswithout anyliquidityproblems.

FINANCIALANALYSIS:

The break-even point of the proposed project is **49.22%**at 70% operating capacity onthird year as shown in**Annexure-F**.

The DSCR of the project has been worked out in **Annexure-H** with an average of**1:2.30,** which is considered quite satisfactory to meet the repayment and interestobligationsin respect of theterm loan.

The**internalrateofreturn**oftheprojectworksoutto**18.00%,**whichissatisfactory.

ANNEXURE-A

ESTIMATEDCOSTOFTHEPROJECT

Particulars	Amount (Rs. lacs)
Land & Site development	Own Land/ On Lease
Building & Civil Works	5.00
Plant & Machinery	6.22
Misc. Fixed Assets	2.09
Preliminary & Pre-operative Expenses	2.11
Contingencies & Escalation @ 5%	0.67
Working Capital	2.36
TOTAL	18.45

TotalProjectCost :Rs. 18, 45,000.00

(RupeesEighteenLakhsandFortyFiveThousandOnly).

ANNEXURE-B

PROPOSEDMEANSOFFINANCE

Particulars	Percent	Amount(Rs.lacs)
EQUITY		
A. Equityfrom Promoters	40%	7.38
B.Subsidyfrom Central/StateGovt.	-	
DEBT		
TermLoanfromBanks/FIs	60%	11.07
TOTAL	100%	18.45

TotalProjectCost: Rs.18,45,000.00

(RupeesEighteenLakhsandFortyFiveThousandOnly).

ANNEXURE-C

WORKINGCAPITALESTIMATES

(Rs.inlacs)

	Period(Days)	TotalCurrentAssets		
		Year1	Year2	Year3
RawMaterials	10	1.80	2.16	2.52
Power &Utility	30	0.13	0.15	0.18
Salary	30	0.90	0.90	0.91
FinishedGoods	15	3.26	3.82	4.39
Receivables	15	3.36	4.04	4.71
Total		9.45	11.08	12.71
WorkingCapitalMargininYear 1 25%)	2.36			

ANNEXURE-D

COSTANDPROFITABILITYESTIMATES

(Rs.inlacs)

Particulars	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6
A.INCOME						
Production Capacity(Ton/ annum)	75	75	75	75	75	75
Capacityutilisation	50%	60%	70%	70%	70%	70%
Production/annumat capacityutilisation	38	45	53	53	53	53
Totalincome/annum	81.88	98.25	114.63	114.63	114.63	114.63
B.OPERATINGEXPENSES						
RawMaterials	65.81	78.98	92.14	92.14	92.14	92.14
Power &Utility	1.55	1.87	2.18	2.18	2.18	2.18
Salary	10.92	10.97	11.03	11.08	11.14	11.20
Repair&Maintenance	0.22	0.22	0.22	0.23	0.23	0.24
OtherExpenses	0.82	0.98	1.15	1.15	1.15	1.15
TotalOperatingExpenses	79.32	93.02	106.72	106.78	106.84	106.90
Operatingprofit	2.55	5.23	7.91	7.85	7.79	7.73
C.FINANCIALEXPENSES						
Depreciation	0.79	0.79	0.79	0.79	0.79	0.79
InterestonTermLoan	0.89	0.80	0.63	0.45	0.27	0.10
InterestonWorkingCapital Loan	0.85	1.00	1.14	1.14	1.14	1.14
NetProfit	0.03	2.64	5.35	5.47	5.58	5.70
NetCashAccruals	0.82	3.43	6.14	6.26	6.37	6.49
PrincipalRepayment	0.00	2.21	2.21	2.21	2.21	2.21

ANNEXURE-

EPROJECTEDBALANCESHEET

(Rs.inlacs)

Particulars	Impl.Period	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6
LIABILITIES							
PromotersCapital							
Promoterscapital	7.38	7.38	7.38	7.38	7.38	7.38	7.38
ProfitfromP&L		0.03	2.67	8.02	13.49	19.07	24.77
SubTotal	7.38	7.41	10.05	15.40	20.87	26.45	32.15
SecuredLoan							
Termloan	11.07	11.07	8.86	6.64	4.43	2.21	0.00
CClimitfromBanks		7.09	8.31	9.53	9.53	9.53	9.53
SubTotal	11.07	18.16	17.17	16.17	13.96	11.74	9.53
UnsecuredLoan							
CurrentLiabilities							
TotalofLiabilities	18.45	25.57	27.21	31.57	34.82	38.19	41.68
ASSETS							
GrossFixedBlock	13.98	13.98	13.98	13.98	13.98	13.98	13.98
SubTotal(a)	13.98	13.98	13.98	13.98	13.98	13.98	13.98
Depreciation							
Cum.Depreciation		0.79	1.58	2.36	3.15	3.94	4.73
SubTotal (b)	0.00	0.79	1.58	2.36	3.15	3.94	4.73
NetFixedAssetBlock (a-b)	13.98	13.19	12.40	11.61	10.82	10.03	9.25
CurrentAssetBlock							
W.I.P.(Inventories)							
Cash&Bankbalance	2.36	1.03	2.05	5.78	10.03	14.40	18.89
OtherCurrentAssets		9.45	11.08	12.71	12.71	12.71	12.71
Sub-Total	2.36	10.48	13.13	18.48	22.73	27.11	31.59
Preliminaryexpensesnotwrittenoff	2.11	1.90	1.69	1.48	1.27	1.06	0.84
TotalofAssets	18.45	25.57	27.21	31.57	34.82	38.19	41.68

ANNEXURE-F

PROJECTEDCASHFLOWSTATEMENT

(Rs.inlacs)

Particulars	Impl.Period	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6
SOURCESOFFUND							
Profitaftertax withdepreciation& interestaddedback		2.55	5.23	7.91	7.85	7.79	7.73
IncreaseinPromoterscapital	7.38						
Increaseinun-securedloan							
IncreaseinTerm Loan	11.07						
IncreaseinBankborrowing(WC)		7.09	1.22	1.22			
Prelim.exp.W/off		0.21	0.21	0.21	0.21	0.21	0.21
DecreaseinWIP(inventory)							
DecreaseinOthercurrentassets							
SubTotal	18.45	9.85	6.66	9.34	8.06	8.00	7.94
USESOFFUND							
Preliminaryexpenses	2.11						
Capitalexpenditure	13.98						
IncreaseinWIP							
RepaymentofTerm Loan		0.00	2.21	2.21	2.21	2.21	2.21
Decreaseinunsecuredloan							
Interestpayment							
TermLoan		0.89	0.80	0.63	0.45	0.27	0.10
Otherbank(W.C)		0.85	1.00	1.14	1.14	1.14	1.14
IncreaseinWorkingcapital		9.45	1.63	1.63			
DecreaseinOthercurrentliabilities							
SubTotal	16.09	11.19	5.64	5.61	3.81	3.63	3.45
Openingcash/bankbalance	0.00	2.36	1.03	2.05	5.78	10.03	14.40
Surplus/Deficit	2.36	-1.34	1.02	3.73	4.25	4.37	4.49
Closingcash/bankbalance	2.36	1.03	2.05	5.78	10.03	14.40	18.89

ANNEXURE-G

DEBT-SERVICECOVERAGERATIO

(Rs.inlacs)

Year	1	2	3	4	5	6
ProfitAfterTax (NetProfit)	0.03	2.64	5.35	5.47	5.58	5.70
Depreciation	0.79	0.79	0.79	0.79	0.79	0.79
Interest	0.89	0.80	0.63	0.45	0.27	0.10
Total	1.70	4.23	6.77	6.71	6.65	6.59
Interest	0.89	0.80	0.63	0.45	0.27	0.10
LoanRepayment	0.00	2.21	2.21	2.21	2.21	2.21
Total	0.89	3.02	2.84	2.66	2.49	2.31
DSCR	1.92	1.40	2.38	2.52	2.67	2.85

AverageDSCR =2.30

ANNEXURE-

HBREAK-EVENANALAYSIS

(Rs.inlacs)

Year	1	2	3
A.Net sales(Rs. lac)	81.88	98.25	114.63
B.Variablecost			
RawMaterials	65.81	78.98	92.14
Power &Utility	1.55	1.87	2.18
OtherExpenses	0.82	0.98	1.15
InterestonWorkingCapital Loan	0.85	1.00	1.14
Totalvariablecost	69.04	82.82	96.60
C.Contribution(A-B)	12.84	15.43	18.02
D.Fixed &Semi-fixed Costs			
Salary	10.92	10.97	11.03
Repair&maintenance	0.22	0.22	0.22
InterestonTermLoan	0.89	0.80	0.63
Depreciation	0.79	0.79	0.79
Totalfixed cost	12.81	12.79	12.67
E.BREAKEVENPOINT	99.79%	82.88%	70.31%
F.BEP at operatingcapacity	49.89%	49.73%	49.22%
G.CashBEP	46.82%	46.66%	46.15%

ANNEXURE-I

INTERNALRATEOFRETURN

(Rs.inlacs)

Year	0	1	2	3	4	5	6
CASHOUTFLOW							
CapitalExpenditure	13.98	0.00	0.00	0.00	0.00	0.00	0.00
WorkingCapital	0.00	9.45	1.63	1.63	0.00	0.00	0.00
Total(A)	13.98	9.45	1.63	1.63	0.00	0.00	0.00
CASHINFLOW							
ProfitAfterTax		0.03	2.64	5.35	5.47	5.58	5.70
Add:Depreciation		0.79	0.79	0.79	0.79	0.79	0.79
Add:Interest		0.89	0.80	0.63	0.45	0.27	0.10
Add:SalvageValue							
Total(B)	0.00	1.70	4.23	6.77	6.71	6.65	6.59
NETFLOW(B-A)	-13.98	-7.75	2.61	5.14	6.71	6.65	6.59

IRR=18%

ANNEXURE-JTERMLOANREPAYMENTSCHEDULE

(Rsinlacs)

Month	Year	1	2	3	4	5	6
Month1	Openingbalance	11.07	11.07	8.86	6.64	4.43	2.21
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest(8%)	0.07	0.07	0.06	0.04	0.03	0.01
	Closingbalance	11.07	10.88	8.67	6.46	4.24	2.03
Month2	Openingbalance	11.07	10.88	8.67	6.46	4.24	2.03
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.07	0.06	0.04	0.03	0.01
	Closingbalance	11.07	10.70	8.49	6.27	4.06	1.84
Month3	Openingbalance	11.07	10.70	8.49	6.27	4.06	1.84
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.07	0.06	0.04	0.03	0.01
	Closingbalance	11.07	10.52	8.30	6.09	3.87	1.66
Month4	Openingbalance	11.07	10.52	8.30	6.09	3.87	1.66
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.07	0.06	0.04	0.03	0.01
	Closingbalance	11.07	10.33	8.12	5.90	3.69	1.48
Month5	Openingbalance	11.07	10.33	8.12	5.90	3.69	1.48
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.07	0.05	0.04	0.02	0.01
	Closingbalance	11.07	10.15	7.93	5.72	3.51	1.29
Month6	Openingbalance	11.07	10.15	7.93	5.72	3.51	1.29
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.07	0.05	0.04	0.02	0.01
	Closingbalance	11.07	9.96	7.75	5.53	3.32	1.11
Month7	Openingbalance	11.07	9.96	7.75	5.53	3.32	1.11
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.07	0.05	0.04	0.02	0.01
	Closingbalance	11.07	9.78	7.56	5.35	3.14	0.92
Month8	Openingbalance	11.07	9.78	7.56	5.35	3.14	0.92
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.07	0.05	0.04	0.02	0.01
	Closingbalance	11.07	9.59	7.38	5.17	2.95	0.74
Month9	Openingbalance	11.07	9.59	7.38	5.17	2.95	0.74
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.06	0.05	0.03	0.02	0.00
	Closingbalance	11.07	9.41	7.20	4.98	2.77	0.55
Month10	Openingbalance	11.07	9.41	7.20	4.98	2.77	0.55
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.06	0.05	0.03	0.02	0.00
	Closingbalance	11.07	9.22	7.01	4.80	2.58	0.37
Month11	Openingbalance	11.07	9.22	7.01	4.80	2.58	0.37
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.06	0.05	0.03	0.02	0.00
	Closingbalance	11.07	9.04	6.83	4.61	2.40	0.18
Month12	Openingbalance	11.07	9.04	6.83	4.61	2.40	0.18
	Repayment	0.00	0.18	0.18	0.18	0.18	0.18
	Interest	0.07	0.06	0.05	0.03	0.02	0.00
	Closingbalance	11.07	8.86	6.64	4.43	2.21	0.00
PrincipalRepayment		0.00	2.21	2.21	2.21	2.21	2.21
Interest		0.89	0.80	0.63	0.45	0.27	0.10

APPENDIX-A1

COSTOFLANDANDBUILDING

CoveredArea–1,000SquareFeet

Particulars	Area(Sq.ft)	Rate(Rs)	Amount(Rs)
WorkShed,StoreHousecum Office	1000	400	400000
		Subtotal	400000
Add:Electrification,Watersupply,SanitationandDrainage @25%			100000
		TOTAL	500000
		Say(Rs. in lacs)	5.00

APPENDIX-A2

COSTOFPLANTANDMACHINERY

Particulars	Qty	Amount(Rs)
Band saw withMotorandaccessories	2	510000
Rectangular saw withMotor	1	
Router CNC machine	1	
Design CNCMachine	1	
Automaticcuttingand curving Machine	1	
Manualcolouring Machine	1	
Measuring /tapScale	1	
Hack saw , Hand saw and small Router	3	
Spare parts & other accessories Equipment's	LS	30000
Miscellaneous cleaning Machine Equipment's	LS	25000
	Subtotal	565000
Add:Taxes, transportationand installationetc@10%		56500
	TOTAL	621500
	Say(Rs. in lacs)	6.22

APPENDIX-A3MISCELLANEOUS

FIXEDASSET

Particulars	Qty	Rate(Rs)	Amount(Rs)
Electrical LoadSecurityandTransformer	LS	--	95000
Furniture'sandFixtures	LS	--	50000
Miscellaneousitems	LS	--	45000
		Subtotal	190000
Add:Taxes, transportationand installationetc@10%			19000
		TOTAL	209000
		Say(Rs. in lacs)	2.09

APPENDIX-A4

PRELIMINARYANDPRE-OPERATIVEEXPENSES

Particulars	Amount(Rs.lacs)
TravellingExpenses	40000
NonRefundableDepositsandProfessionalFees	87000
Interestduringimplementation	49040
Miscellaneousexpenses	35000
TOTAL	211040
Say(Rs. in lacs)	2.11

APPENDIX-C1

MANPOWERREQUIREMENT&COST

Thesalaries andwages ofdifferenttypes ofmanpowerisprojected asfollows:

ParticularsofEmployee	Numbers	Salary/ Month(Rs)	Cost/ annum (Rs)
Manager	1	12500	150000
SalesPerson	4	8250	396000
SkilledWorkers	2	6250	150000
Semi-SkilledWorkers	3	5000	180000
UnskilledWorkers	4	4500	216000
Expensesonsalaryin the1styear(Rs)			1092000

Increaseof0.50%hasbeenconsideredeverysubsequentyear.

APPENDIX-C2

POWERANDUTILITY

A.ExpensesonPower

Particulars	Quantity	Power(Kw)	Total(Kw)
Plant &Machinery(Total HP of 20)	1	14.92	14.92
GeneralLighting	25	0.10	2.50
Totalpowerrequirement/day(Kw)			17.42

No. ofhrs/day	8
Nos.ofdays/annum	300
Annualpower requirement(kwh)	41808
Rateperunit(Rs)	6
Expensesonpower(Rs)	250848

B:Estimate ofUtility

ExpensesonWater/OtherUtilities(Rs)	60000
Expenses onPower &Utilityat100% capacity(Rs)	310848

APPENDIX-D1

REPAIRANDMAINTENANCECOST

(Rs.inlacs)

Particulars	Cost(Rs)	Contingencies	Total	Rate	Amount(Rs)
Building&Civil Works	5.00	0.25	5.25	1.00%	0.05
Plant &Machinery	6.22	0.31	6.53	2.00%	0.13
Misc.FixedAssets	2.09	0.10	2.19	1.50%	0.03

APPENDIX-D2

ESTIMATESOFINCOME

(Basis-100% CapacityUtilisation)

Particulars	Qty	Price per Unit(Rs.)	Amount(Rs.)
Teak fabricated round	3000 Nos	3400	10,200,000
Round table	400 Nos	13000	5,200,000
Chair	400 Nos	1800	7,20,000
Toy	200 Nos	1275	2,55,000
TotalSalesper annumat100%capacity(Rs)	4000 Nos		16,375,000

APPENDIX-D3

INTERESTONWORKINGCAPITAL

Particulars	Year1	Year2	Year3
TotalCurrentAssets	9.45	11.08	12.71
Bank Loan(75%)	7.09	8.31	9.53

(Rs.inlacs)

APPENDIX-D4

DEPRECIATIONSCHEDULE

(Rsinlacs)

Description	Cost(Rs)	Contingencies	Total	Rate	Amount/ annum (Rs)
Building&Civil Works	5.00	0.25	5.25	3.17%	0.17
Plant &Machinery	6.22	0.31	6.53	6.33%	0.41
Misc.FixedAssets	2.09	0.10	2.19	9.50%	0.21
TOTAL	13.31	0.67	13.98		0.79

2. Details of test facilities available in India:-

a) Sri Rahul Gupta, BA - 15, Mangolpuri Industrial Area, Phase - 2
Mangolpuri S Block, New Delhi - 110034, India
https://www.indiamart.com/sgm-lab-solutions
Call 09811565000.

Product Description:-

a) Sigma Test & Research Centre provides testing services for Wood such as;

- Modulus of rupture:, Modulus of elasticity, Internal bond strength:
- Moisture content, Density, Bending strength, Compression strength:
- Wood-based panels, Absorbability, Swelling in thickness, Ability to hold a screw:
- Dimensions stability, Wood quality, Impact of a soft body, Resistance to indentation:
- Flush Door Shutter, Pre laminated particle board, MDF / MDP Board:
- FRP / GRP door shutter, Ply wood:

Sri Rahul Gupta

BA - 15, Mangolpuri Industrial Area, Phase - 2
Mangolpuri S Block
New Delhi - 110034, India
https://www.indiamart.com/sgm-lab-solutions, Call 09811565000

Product Description

Sigma Test & Research Centre provides testing services for Wood such as;

- Modulus of rupture:
- Modulus of elasticity:
- Internal bond strength:
- Moisture content:
- Density:
- Bending strength:
- Compression strength:
- Wood-based panels:
- Absorbability:
- Swelling in thickness:
- Ability to hold a screw:
- Dimensions stability:
- Wood quality:
- Impact of a soft body:
- Resistance to indentation:
- Flush Door Shutter:
- Pre laminated particle board:
- MDF / MDP Board:
- FRP / GRP door shutter:
- Ply wood:

M/S Sigma Test & Research Centre

Regd. Office: 99, Badli Industrial Area, Phase 2, New Delhi, Delhi 110042

Branch Office: No.26, "Shri" Complex, 2nd Floor, Bendre Nagar, Above "SBM" ATM, Subramanya Pura Main Road , Kadirenahalli, Bangalore-560070, India.

Product Description:-

We are rendering **Wood and Furniture Testing Service** to our patrons. Due to prompt completion, our offered service is extremely admired in the market. Our service meets on client's demand. Moreover, we render this service as per patron's demand.

Rajesh Kumar Roshan, D 14/8, Okhla Industrial Area, Phase 1
Okhla Industrial Area, New Delhi - 110020, India, https://www.indiamart.com/unique-india-lab
Call 08046067782

MDF Testing IS 12406
Sold By - Wood Certification Private Limited, Delhi, **Wood Certification Private Limited**
Karol Bagh, New Delhi,

Jayanti Bhai, No.16, Dharti TenamentNikol
Ahmedabad - 382350, Gujarat, India, https://www.jklaboratory.com
Call 08048022441

Product Description: Wood Testing Services

General Parameters:

1	Modulus of rupture
2	Modulus of elasticity
3	Internal bond strength
4	Moisture content
5	Density
6	Bending strength
7	Compression strength
8	Wood-based panels
9	Absorbability
10	Swelling in thickness
11	Ability to hold a screw
12	Dimensions stability
13	Wood quality
14	Impact of a soft body
15	Resistance to indentation
16	Flush Door Shutter
17	Pre laminated particle board
18	MDF/MDP Board
19	FRP/GRP door shutter
20	Ply wood

Wood Testing Services

Sold By - Marg Test Lab & Engineering Services, Rajgarh, Madhya Pradesh.

We are passionately engaged in supplying an exclusive range of **Wood Testing Services**. Offered testing service is executed as per the set standards using modern testing instruments & techniques. We interact with our customers for taking their needs before rendering the testing service. Customers can avail this testing service in a stipulated time frame at affordable price.

Teak Wood Testing Service
Sold By - Ace Test House, New Delhi

M/s Sigma Test & Research Centre, Regd. Office: 99, Badli Industrial Area, Phase 2,
New Delhi, Delhi 110042.
Branch Office: No.26, "Shri" Complex, 2nd Floor, Bendre Nagar, Above "SBM" ATM, SubramanyaPura Main Road, Kadirenahalli, Bangalore-560070, India.

Product Description
We are rendering **Wood and Furniture Testing Service** to our patrons. Due to prompt completion, our offered service is extremely admired in the market. Our service meets on client's demand. Moreover, we render this service as per patron's demand.

3. Details of Raw materials suppliers:-

Bonafide Exports

1. Manufacturer and supplier, 1030/740, Nakoda Industrial Estate
Near Krishna Dharma Kanta Basni- IInd Phase, Jodhpur
Rajasthan - 342 006, India Ph: +91-291-3291313 Fax: +91-291-2745918

2. Classic Timbers, Exporters of teak wood. 19 West Cross Ashoka Road, Mysore
Karnataka - 570 001,India Ph: +91-821-2480467
3. **Cosmopolitan Handicrafts Export,** Manufacturers and exporters, Pushpa Bhawan,
Near Railway Hospital, Jodhpur, Rajasthan - 342 001, India Ph: +91-291-2430268 Fax: +91-291-2430268,
www.cosmopolitanhandicrafts.com

4. **Crystal Creations,** Manufacturer and Exporter, TA-95, 1st Floor, Tughlakabad Extn, Main Okhla Road,
New Delhi- 110 019, India Ph: +91-11-55791673 Fax: +91-11-26059777

5. **Indian Furniture Inc. (Fur) Indian Furniture, Sri Tarun Agarwal, H-74, Shastri Nagar Jodhpur, Rajasthan, India, Postal Code: 342003, Ph:+ 91-291-2644755**
Fax: +91-291-2644755, www.thevinayak.com
6. **Indian Timber Products Pvt. Ltd.,Manufacturers and exporters, 604, Swarnajayanthi Complex , Ameerpet, Hyderabad, Andhra Pradesh - 500 038, India Ph: +91-40-23757768/ 23757527**
Fax: +91-40-23757527

7. Sri Krishna Saw Mill And Wood Works, Exporters No 275/7, New Timber Yard Layout
Mysore Road, Bangalore, Karnataka - 560 026 India, Ph: +91-80-6743151 Fax: +91-80-6743712

8. Teakstar India (Log) Parag Shah, D. S. Trade Centre, Station Road, Vidyavihar West
Mumbai, Maharashtra, India, Postal Code: 400086, Ph: +91-22-65565576, Fax: +91-22-25105576
www.teakstar.com

9. Royal India Exports & Imports, Kottayam India, Phone: 0091860655468,
Email:tkuruvilla30@yahoo.com
10 Jawahar Saw Mills Pvt Ltd, Jawahar 47, Victoria Road, Mustafa Bazaar
Mumbai-400010,India, Phone:+919820284447, Email:gaurav.agicha@jawahar.in
URL:www.jawahar.in

11. Typical Teak Panni code Post Mukkam, Kozhikode,Kerala-673602, India, Phone:9447 21 94 11
Email:teak@typicalteak.com, URL:www.typicalsuppliers.com

12. Mr. RT Somaiya, Self Employed Consultant, 2/4 Hind Society, Sion- Chunabhatti
Mumbai- 400022, M S, India, Phone: 912224077614,Email:rtsomaiya@gmail.com

13. The Western India Plywoods Limited, (V/P) Mill Road, Baliapatam , Kannur Dist, Kerala State
India PIN - 670 010 Ph : +91-497-277815, Fax: +91-0497-2778181 info@pressboards.com

Teak Manufacturing of Machinery suppliers / Traders in India:-

1. A. K. Lumbers Ltd., Manufacturers suppliers and exporters of teak wood ,
92/4, WHS-II, Kirti Nagar, New Delhi - 110 041, India Ph: +91-11-51421758,Fax: +91-11-51421360

2. Adbhuta Manufacturer and Exporter, 661, Silver Oak Marg, Ghiltorni M.G.Road
Delhi - 110 030, India Ph: +91-9810192799/9811034406 Fax: +91-11-25752253

3. Agarwalla Enterprises, Sri Rakesh Goyal, 23/60 Punjabi Bagh West, New Delhi, India
Postal Code: 110026, Ph: +91-11-28342262

4. F **Ajay Wood Products,** Manufacturers and Exporters Bilaspur Road
Village Harnoli, Jagadhri, Haryana - 135003
India Ph: +91-1735-254177/230138 Fax: +91-1732-254166, Fax: +91-11-25220083

5. Akanksha Enterprises , Sri Sundeep Damani, Director, Arundale Beach Road, 3rd Street,
Chennai, Tamil Nadu, India Zip/Postal Code: 600 090,Ph: +91-44-24460673, Fax: +91-44-52187549

6. Ak-square & Co.(W/D) Sri Aditya K.K, Sales & Exports, #301b, Aoc Apartments, Plot 35&36, Brooke
Bond Colony, Secunderabad, Andhra Pradesh, India Zip/Postal Code: 500015
Ph: +91-9848-983982, Fax: +91-9848-983982

7. Alankar Timber Suppliers of all kinds of teak wood, Behind Patidar Samaj, Nagpur Road
Jabalpur, India Ph: +91-98-33549211

8. Alleppey Veneer Industries (V/P) Sri Shanavas Thazhakath
Vadackal, Alleppey, Kerala, India Postal Code: 688003, Ph: +91-477-2262566, Fax: +91-477-2262566

9. Ambalika Plywood Private Limited, Manufacturer and Exporter, 2449, Club Colony
Civil Lines, Jagadhri, Haryana - 135 003, India Ph: +91-1732-241708/241657/245709
Fax: +91-1732-245709/241657

10. **Anjana Exporters,** Manufacturer Anjana Niwas, Shreenagar Colony , Gita Mandir Road
Ahmedabad, Gujarat - 380 022, India Ph: +91-79-25354969 Fax: +91-79-25320649

10. **Ansh Impex,** Supplier of teak wood 2/A, Pithle house, Mumbai, Maharashtra - 400 007
India Ph: +91-22-45647575

11. **Anteak Concepts & Designs Pvt.Ltd (Sp) Sri Ashta Bassi,** CEO
45/77 West Punjabi Bagh, New Delhi, India , Postal Code: 110026
Ph: +91-11-52463546, Fax: +91-11-25226177

12. **Anuradha Timbers International,** Exporters of Timber 244 Chinnatokatta
New Bowen ally, Secunderabad, Andhra Pradesh - 500 033
India Ph: +91-40-55212511 Fax: +91-40-27750252

14. Timber Track Exporters and suppliers of teak wood , Ferry Road, Valapattanam, Kannur Kerala - 670 011 India Ph: +91-497-2778593/2775214/9895492562 Fax: +91-497-2775214

15. Siddhi Manufacturer and supplier of teak wood, A 3/E, Sunder Path, Banipark, Jaipur Rajasthan - 302 016 India Ph: +91-141-2208078 Fax: +91-141-2208303, www.siddhi-india.com

16. Lakshmi Furniture and Decorators, Manufacturers and suppliers , C-25, Sec-9, Noida Uttar Pradesh - 201 301 India Ph: +91-120-2540094 Fax: +91-120-5322736

17. Landmark Stone Engaged in supplying and exporting teak wood items , 47-48, Manik Vilas Colony Near Railway Station, Gwalior, Madhya Pradesh - 474 002, India Ph: +91-751-5011271/5011273 Fax: +91-751-2230204

18. Laxmi Timber Traders (Log), Rupesh Patel, Director, Goodshed Road, Trichy, Tamil Nadu India Zip/Postal Code: 620002 Ph: +91-0431-2700209, Fax: +91-0431-2711209

19. M K M Impex (W/D) , Suresh M K , Timber Swan S4s.Ad.Kd.Exports, No.240 appar Street, Senthil Nagar, Chennai, Tamil Nadu, India, Ph: +91-44-32944973, Fax: +91-44-26360484

4. Details of the Machinery suppliers:-

Teak Manufacturing of Machinery suppliers / Traders in India:-

1. A. K. Lumbers Ltd., Manufacturers suppliers and exporters of teak wood , 92/4, WHS-II, Kirti Nagar, New Delhi - 110 041, India Ph: +91-11-51421758,Fax: +91-11-51421360

2. Adbhuta Manufacturer and Exporter, 661, Silver Oak Marg, Ghiltorni M.G.Road Delhi - 110 030, India Ph: +91-9810192799/9811034406 Fax: +91-11-25752253

3. Agarwalla Enterprises, Sri Rakesh Goyal, 23/60 Punjabi Bagh West, New Delhi, India Postal Code: 110026, Ph: +91-11-28342262

4. F **Ajay Wood Products,** Manufacturers and Exporters Bilaspur Road Village Harnoli, Jagadhri, Haryana - 135003 India Ph: +91-1735-254177/230138 Fax: +91-1732-254166, Fax: +91-11-25220083

5. Akanksha Enterprises , Sri Sundeep Damani, Director, Arundale Beach Road, 3rd Street, Chennai, Tamil Nadu, India Zip/Postal Code: 600 090,Ph: +91-44-24460673, Fax: +91-44-52187549

6. Ak-square & Co.(W/D) Sri Aditya K.K, Sales & Exports, #301b, Aoc Apartments, Plot 35&36, Brooke Bond Colony, Secunderabad, Andhra Pradesh, India Zip/Postal Code: 500015 Ph: +91-9848-983982, Fax: +91-9848-983982

7. Alankar Timber Suppliers of all kinds of teak wood, Behind Patidar Samaj, Nagpur Road Jabalpur, India Ph: +91-98-33549211

8. Alleppey Veneer Industries (V/P) Sri Shanavas Thazhakath Vadackal, Alleppey, Kerala, India Postal Code: 688003, Ph: +91-477-2262566, Fax: +91-477-2262566

9. Ambalika Plywood Private Limited, Manufacturer and Exporter, 2449, Club Colony Civil Lines, Jagadhri, Haryana - 135 003, India Ph: +91-1732-241708/241657/245709 Fax: +91-1732-245709/241657

a) **Scheme and consultancy services:-**

1. MSME-DI and MSME-TC under M/o of MSME n, GoI

2. IITs

3. CISRs

4. any consultancy's in the countries respective trade lines

1.Existing scheme available and their details:-

a) Credit Guarantee scheme for Micro & Small Enterprises (CGTMSE):-

Objective:- Credit Support

Key Benefits:-

- **Credit guarantee for loans up to Rs 2 crore, without collateral and thirty –party guarantee.**
- Guarantee coverage ranges from 85% (Micro Enterprise up to Rs 5 lakh) to 75% (others).
- 50% coverage is for retail activity.

Scheme applicable for

- **Existing Enterprenuers & aspiring Enterprenuers.Detailed Information**

Any collateral/third party guarantee free credit facility (both fund as well as non-fund based) extended by eligible institutions, to new as well as existing Micro and Small Enterprises, including Service Enterprises, with a maximum credit cap of 200 lakh (Rupees Two Hundred lakh only) are eligible to be covered. Recently, guarantee coverage made eligible to select NBFCs and Small Finance banks

The guarantee cover available under the scheme is to the extent of 50%/ 75% / 80% & 85% of the sanctioned amount of the credit facility. The extent of guarantee cover is 85% for micro enterprises for credit up to 5 lakhs. The extent of guarantee cover is 50% of the sanctioned amount of the credit facility for credit from 10 lakh to 100 lakhs per MSE borrower for retail trade activity

The extent of guarantee cover is 80% for (i) Micro and Small Enterprises operated and/or owned by women; and (ii) all credits/loans in the North East Region (NER)for credit facilities upto 50 lakh. In case of default, Trust settles the claim up to 75% of the amount in default of the credit facility extended by the lending institution for credit facilities upto 200 lakh

b) Credit Linked Capital subsidy Component (TUS):-

Objective:-Technology Support/ Credit Support

Key Benefits:-

- **Induction of established and improved technologies**
- **15% Subsidy on institutional credit up to Rs 1.00 crore with a subsidy of Rs 15.00 lakh**

Scheme applicable for: -Credited Linked capital subsidy.

- **Existing Entrepreneurs' & Aspiring Entrepreneurs'**

Detailed Information:-

- The objective of CLCS component of CLC-TUS is to facilitate technology to MSEs through institutional finance for induction well established and proven technologies in the specific sub-sector/products approved under the scheme.
- (a)Upfront subsidy of 15% on institutional credit up to Rs. 1.0 crore (i.e. a subsidy cap of Rs. 15.00 lakh) for identified sectors/subsectors/ technologies.
- b)Flexibility for review of the identified technologies/ subsectors also exists
- (c)Presently scheme is being implemented through 11 nodal banks/agencies, however, almost all Commercial Banks, Pvt. Banks & RRBs are acting as PLI through these 11 nodal banks/agencies {SIDBI, NABARD, SBI, Andhra Bank, PNB, BoB, Canara Bank, Corporation Bank, Indian Bank, Bank of India, & TIICL.
- d) In order to ensure fair inclusion of SC/ST category, women entrepreneurs and entrepreneurs from NER, Hill States (Jammu & Kashmir, Himachal Pradesh & Uttarakhand) Island Territories (Andaman & Nicobar and Lakshadweep) and the identifies Aspirational Districts/LWE Districts, the subsidy has also been proposed to be admissible also for investment in acquisition/replacement of plant & machinery/equipment & technology up-gradation of any kind.

c) **Public Procurement Policy for MSEs Order, 2012:-**

Objective: Providing Marketing support to the MSEs.

Key Benefits:

- Tender set of cost
- Exemption from the payment of Earnest Money
- In Tender, Participating MSEs Quoting Price within band of L1+15% shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where price is from someone other than an MSEs and such MSEs shall be allowed to supply up to 25% of the total tendered value.
- 358 items reserved for exclusive procurement from MSEs.
- The MSEs may also be given exemption in prior experience and turnover clauses.

Scheme applicable for:-

- The Public Procurement Policy mandates 25% annual procurement from MSEs by Central Ministries/ Department/ Public sector Enterprises (CPSEs)
- Public Procurement Policy is meant for procurement of only goods produced and services rendered by MSEs and works contract is not covered under the purview of Publicprocurement Policy.
- MSEs registered with District Industries Centre (DIC) or Khadi & Village Industries Commission (KVIC) or Khadi & Industries Board (KVIB) or Coir Board or national Small Industries Commission (NSIC) or Directorate of Handicrafts and Handlooms or any other body specified by Ministry of MSME or having Udyog Aadhaar Memorandum (UAM) are eligible to avail the benefits of the policy.

Detailed Information:-

- Ministry of MSME has notified the Public Procurement Policy for MSEs Order, 2012 under Section 11 of MSMED- Act 2006 to provide marketing support to the MSEs which is effective from April 2012 and has become mandatory w.e.f 1st April 2015. It was again reviewed in 2018 and amended vide SO 5670 (E) dated 9 November 2018. The amended policy mandates 25% of annual procurement from MSEs by the Central Ministries/ Departments and CPSEs including 4% from MSEs owned by SC/ST and 3% from MSEs owned by Women.
- Any registered MSE can register themselves at GeM Portal and avail the benefits of the Public Procurement Policy.

d) Design clinic for Design Expertise to MSMEs:

Objective: -Technology Support

Key:-

- To facilitate MSMEs to develop new Design strategies and or design related products through design interventions and consultancy. Financial assistance to the MSMEs for engagement of design consultants for design intervention (GoI contribution @ 75% for micro, 60% for SMEs for the project range up to Rs. 40 lakh)
- The Design scheme shall support design work by reimbursement 75% of expenses incurred up-to Rs 1.5 lakh for final year student project done for MSMEs

Scheme applicable for:-

- **Existing Entrepreneurs'**

Detailed Information:-

To bring Indian Manufacturing sector and design expertise/ design fraternity on to a common platform and to provide expert advice and cost-effective solution on real time design problems, resulting in new product development , continuous improvement and value addition for existing products including new products.

d) Export Market Promotion:-

Objective: Export marketing support

Key Benefits:

- Participation in International Exhibitions &Buyer Seller Meets
- External Market Development Assistance.

Scheme applicable for: - Existing and aspiring entrepreneurs

Detailed information:
Individual entrepreneurs can avail of EMDA scheme for participating in International Exhibitions as per approved calendar.

e) Awareness on Intellectual Property Rights (IPR):-

Objective: -Technology Support

Key Benefits

- Reimbursement of Patent Trademark/ GI:
- Patent
- A. Indian patent up to Rs 1.00 lakh
- B. Foreign Patent up to Rs 5.00 lakh
- Trade mark up to Rs 0.10 lakh
- GI Registration Rs 2.00 Lakh
- Assistance for setting up IP Facilitation centre up to Rs 1.00 cr for period of 5 years.

Scheme applicable for: - Existing and aspiring entrepreneurs

Detailed Information

- To enhance the awareness of Intellectual Property Rights (IPR) amongst the MSMEs to encourage creative intellectual endeavour in Indian economy.
- To take suitable measures for the Protection of ideas, technological innovation and knowledge driven -business strategies developed by the MSMEs for
- To provide appropriate facilities and support for protection and commercialization of Intellectual property (IP) for the benefit of MSME sector
- To assist MSMEs in effective utilization of IPR tools for technology up- gradation, market and business promotion and competitive enhancement.

How to apply: click here view IPR
Guidelines http://www.dcmsme.gov.in/schemes/IPR-GuideLines-CLCS-TUS-2019-2020.pdf

Credit Linked Capital Subsidy for Technology Up-gradation (CLCSS):-

Objective: - CLCSS provides 15% subsidy for additional investment up to ₹ 1 cr for technology up-gradation by MSEs. Technology up-gradation would ordinarily mean induction of state-of-the-art or near state-of-the- art technology. In the varying mosaic of technology covering more than 7,500 products in the Indian small scale sector.
List of technologies is available at http://www.dcmsme.gov.in

2. Proposed scheme (if existing is not suitable):-

Details

- **Condition**

New Diamond Black Resin & finely crafted sheesham wood naturally aged for 99+ years to make it long lasting with Japanese style metal legs. Dimensions: 48"(L) X 29"(W) X 18"(H) X 1.5"(T). Instagram: https://www.instagram.com/tablesandbeyond/ Website: http://www.tablesnbeyond.com

3. Details of agencies who can provide Guidance (CSIR, MSME_TC, Sector councils, etc):-

Identification of product to reduce import and to encourage the manufacturing in MSME sector in the country by JDs. (2021-22)

Import and Export data for 358 items reserved under Public Procurement Policy (PPP) for MSEs as per DGCIS

Action Plan target:-

This report is part of a cross-country research initiative that focuses on Micro small and medium (Forestry)Enterprises and their potential contribution to poverty reduction and sustainability. It isbased on a short scoping study, designed to gather background information, present key issues,and identify where further research will be most relevant and useful.

The research for this report was carried out by Winrock International India, New Delhi (WII), incollaboration with the International Institute for Environment and Development, London (IIED),who also coordinated the overall initiative. It builds on the findings of earlier research carried outunder a WII/IIED collaboration, on 'Instruments for Sustainable Private Sector Forestry'.
TheIndia country study ("The new foresters: the role of private enterprise in the Indian forestrysector", by Saigal, Arora, and Rizvi, 2002) under this international initiative identified that whilstcurrent policy sometimes restricts the activities of large-scale enterprises in the forestry sector(for example disallowing the development of large plantations on forestry land; opening up tocheap imports which render Indian products uncompetitive), there has been a significantexpansion in activities in the small scale sector in recent years. Such activities include thecollection, processing and marketing of non-timber forest products (including medicinal herbs),the production and marketing of timber by farmers, and the joint management and beginnings ofcommercial exploitation of forests by joint forest management communities. These and manyother activities show that India has a diverse, active and growing small-scale sector, which alsohas the potential to contribute to livelihoods and sustainability.

The Micro **small Medium Enterprises sector**in India mirrors global trends in small and medium enterprises, which indicate that small and medium enterprises represent one of the fastestgrowing industrial sectors in the world.
(Note that in India, while small enterprises are clearlydefined, there is no clear definition of medium enterprises. The official category that correspondsto small enterprises is that of small-scale industries, or SSIs. In India, the SSI sector accountsfor around 95 per cent of the industrial units, 40 per cent of the manufacturing sector output, 45-50 per cent of exports (directly and through export houses etc), and provides direct employmentto more than 19 million people in around 3.4 million registered SSI units.
It is estimated thateach million rupees of investment in fixed assets in the small-scale sector leads to production ofgoods and/or services worth Rs.4.62 million annually, with an approximate value addition of tenpercentage points. This sector also creates the largest employment opportunities outsideagriculture. It is estimated that Rs.100, 000 of investment in fixed assets in the small-scale sectorgenerates employment for four people.

As regards the **MicrosmallMedium forestry sector**, available information strongly indicates that thebulk of forest produce processing in India is carried out by Micro small Medium (forestry)Enterprises(MSME), and that these enterprises play an important role in the national economy. As well asprocessing a wide range of products, MSMEs are also involved in production of forest products.Amongst the diverse range of activities carried out by the Indian MSME sector are production orcollection of products such as fuel wood, poles and non timber forest products; their processingeither by hand (e.g. leaf plate stitching) or by modern machinery, and marketing at every levelranging from barter at the local level to export to international markets.
The sector produces awide range of products such as poles, fuel wood, charcoal, sawn timber, furniture, veneer, plywood, block board, fibreboard, particle board, paper, safety matches, sports goods,handicrafts, herbal medicines and other non-timber forest products.
Due to the diversity of products, markets and policies, it is difficult to make generalisations forthe entire MSME sector. Still, there are certain features of the sector that are clearly discernible:

- While most of India's forests are owned by the government, the bulk of MSMEs are in the *private sector*. It is estimated that more than 90% of India's wood-based products arepresently manufactured in the private sector.
- SMEs are an *important player in the forestry sector*. For example, 98% of the sawmills in India are small, and they produce as much as 82% of the sawn timber. About 87% of plywood factories and 94% of paper mills also fall into the small enterprise category. It is estimated that the wood processing industries in India process about 24 to 30 million m3 of wood per annum, the bulk of which is processed by MSMEs.
- *Farmers and communities are important producers* though their contribution is not widely recognised or acknowledged. Joint forest management communities are now protecting over 18% of India's forests and half the industrial wood supply is coming from non-forest sources, mainly farms.

- There are many *very small enterprises that cater to local demand*. For instance, it is estimated that 2.1 million bullock carts are constructed each year, as are 50 million yokes, 100 million wooden ploughs and 30 million wooden seeders. Most of this demand is met by local artisans who utilise local raw materials and traditional skills.
- GenerallyMSMEs are by nature *location specific*, which is determined on the basis of the availability of resource, labour and markets. For instance, most safety matches are manufactured in Tamil Nadu, whilst the bulk of sports goods are manufactured in just two cities.
- SMEs generate *significant employment* in India. While it is difficult to obtain national figures, available industry wise figures do indicate large-scale employment in this sector. It is estimated that 30-40 million people are directly or indirectly involved in the *beedi* industry, many of whom are *tendu* leaf collectors and beedi rolling workers. Nearly half a million people are employed in safety match making, sawmilling and wood carving.
- Some SSFEs also earn valuable *foreign exchange* e.g. medicinal plants and wood carving industries.

The **policy environment:-**

For small scale industries in India is generally very favourable: MSMEsenjoy protection as well as a number of concessions. A number of items are reserved for MSMEsand they are entitled to special excise concessions, preferential treatment from banks forobtaining credit and various export incentives. However, with economic liberalisation andchanges in the trade policy, MSMEs have started facing increased competition from foreigncompanies. The labour law framework is also quite stringent though its implementation is ratherweak.

As far as the forestry enterprises are concerned, there is a range of government policies , whichare of relevance: these include the industrial, labour, trade, forest and environment policies.Some of these such as industrial and labour policies are generally applicable to all MSMEs thoughin some highly labour intensive industries such as *beedi*, safety match making, etc. labour lawshave much greater importance. MSMEs are more directly affected by forest and environmentpolicies. While the access to forests has been increasingly getting difficult for the organisedindustry sector, new opportunities are emerging for household and community level enterprisese.g. through the Joint Forest Management programme.

The forest produce production enterprises (e.g. farm forestry plantations) face other restrictions,such as requirements of felling and transit permits and land ceiling laws. The policy environmentalso varies according to the industry. For instance, while there are special environmentprotection provisions for hazardous industries such as paper mills, certain trade restrictions areapplicable to the medicinal plants and herbal medicine industry.

The great diversity of products that they produce and process makes it impossible to define**overall trends in Micro small Medium (forestry)Enterprises**.

However, just examining three industries(small paper mills, lacquer ware and safety match) show that there has been a general increasein activity in MSMEs, sometimes encouraged by government incentives, sometimes because ofthe inherent comparative advantages of small-scale units over larger ones – for example theability of small-scale paper mills to make use of limited volumes of agricultural residues availablelocally. However, increased activity can also signal a change in the employment structure – forexample in the lacquer ware industry, increased mechanisation led to a greater proportion ofmen being employed. Finally the impression given by numerous small-scale enterprises can bemisleading: they are not necessarily autonomous but might be controlled and owned by wealthy, powerful organisations – as is evident in the case of safety matches.

It is difficult to get a clear picture regarding **imports and exports of forest products**, as thedata is categorised in such a way that often, several forest and non-forest products are clubbedtogether in one commodity class. However in general terms over the period 1996-2002, forestryimports have fluctuated between approximately 2% and 3% of total imports, whilst exports havealways remained around 1% of total exports. Certain MSMEs such as wood carving industry andmedicinal plants contribute significantly to exports while others such as sawmills, plywood andpanel industry and paper industry uses significant quantity of imported raw material.

Like any other sector, there are a number of **opportunities and threats** facing the MSME sector. The main opportunities available to the MSME Sector are:

- *Government incentive schemes,* which are available to MSMEs in general.
- *Government protection measures* such as the reservation of a large number of items for exclusive purchase from MSME.
- There are also several *emerging or rapidly growing markets* such as herbal medicines and packaging, where MSMEs can play an important role.
- *Dwindling supplies of raw material* from government forests on account of degradation

and/ or green felling bans have also created opportunities for new producers such as farmers and communities.

The growth of farm forestry in certain areas e.g. the *Tarai* and coastal Andhra Pradesh has, inturn, opened up new opportunities for establishing *new processing industries* in these areas. Forinstance, a number of processing industries have been established in Yamuna Nagar (Haryana)due to the growth of farm forestry in the area.

The key *threats* faced by MSMEs in India are:

- **A *growing shortage of quality raw material* due to felling bans and restrictions on extraction in several states.**

However, while this is certainly a threat to processingindustries, as noted above it is actually also an opportunity for production enterprisessuch as farm forestry plantations.

- **Growing *concerns over environmental and labour issues* are also significant threats.**

In recent years, many court rulings have also resulted in the closure of many forest produceprocessing industries on account of enhanced environmental concerns. The industries inthe north-eastern states and the Andaman and Nicobar Islands have been particularlybadly affected.

- **Since economic liberalisation there has been *growing competition from cheap imports***and a trend towards removal of protective policies, such as reservation. Indian MSMEs are generally quite inefficiently run, the quality of products is poor and there is lack of standardisation – thus they are quite uncompetitive internationally.
- **Stringent application of an international *intellectual property rights regime***is also likely toaffect Indian MSMEs, especially processing industries, adversely.

There are a number of **federations and associations** that have been formed byMSMEs (forestry) Enterprises. While some focus their attention only on small enterprises, others have membership from across the industry. Most are focused on a particular industry or even a particular group within the industry e.g.*beedi* (country cigarette) workers. Most associations and federations act as pressure groups to further the interests and welfare of their members. Some even actively try to influence policies – for example the Indian Paper Makers Association lobbied in favour of leasing degraded forest lands. Workers' associations (which are usually affiliated to a particularpolitical party) also try to influence policy decisions through actions such as conventions, ralliesand protests – whether the issue be globalisation, the national minimum wage or the threatposed to the tobacco industry from bans on smoking in public places. However, not allassociations are as active: some associations see their aim simply to "set rates" for payment togovernment inspectors and other officials.

This scoping study shows that whilst India's MSME sector processes the majority of forest products and provides employment to millions of poor people, it has not received the attention itdeserves. Within the forestry sector, the focus has traditionally been on large enterprises – yet there is clearly a **need for more research on small scale enterprises**. India has a very large number of poor (about 260 million) and indigenous peoples (about 80 million), many of whom depend on forest-based livelihoods. Millions of poor people earn their livelihood throughfuelwood and non timber forest product collection, processing and sale. It is estimated that nontimber forest product-based MSMEs alone provide up to 50% of the income of 20-30% of therural labour force in India. Landless and poor women often form a significant proportion of thelabour force in many MSMEs. Even among landed farmers, earnings from MSMEs usuallyimprove their income security and reduce pressures that lead to over-exploitation of theagricultural land base. MSMEs also boost the local economy through local purchase of rawmaterial e.g. farm grown timber from farmers, and improve the technical skills of the workers.

Itis anticipated that as the capacity of agriculture to generate additional livelihoods progressivelydeclines, more and more rural people will turn towards employment in MSMEs and other Micro small Medium Enterprises in future. The MSMEs can play an important **role in improving rural livelihoods**, especially of the poor. Thisnot only reduces pressure on scarce agricultural land but also decreases stress out-migrationfrom rural areas into cities, where the poor often end up living in slums under sub-humanconditions.

Some of the characteristics of SSFEs that indicate their suitability for generating local Livelihood opportunities for the poor and other vulnerable groups are:-

- they are small in size and are often household based;
- they are predominantly rural and frequently seasonal;
- they are labour intensive and use simple technologies;
- they require very low capital inputs;
- they are accessible to low income and socially disadvantaged groups;
- they provide direct benefits to the local economy; and,

- women are heavily involved, often forming a majority of the labour force.

Yet the contribution of MSMEs to rural livelihoods as well as its potential in improving resourcemanagement is poorly understood and not adequately recognised by resource managers andplanners alike:

- Those involved in collection and household level processing based enterprises (e.g. leaf Plate stitching, rope making, etc.) face serious policy bottlenecks that limit their returns. For instance, most commercially important non timber forest products are nationalised and collectors are not allowed local processing for sale.
- Farmers, although now major producers of industrial wood in India, face constraints such as requirements for felling and transit permits and restrictions on growing and sale of certain forest products.
- Over 63,000 community groups are protecting and managing over 14 million hectares of forests (over 18% of all state forest lands). They have begun to produce millions of tonnes of forest produce annually but their production role has received scant policy attention. Many joint forest management groups are facing serious marketing problems and this is threatening the future of the entire joint forest management programme.

One reason for this poor understanding is that data is scattered and there is a **lack of aggregated information** at the national level. The information that is available is scattered indifferent departments and ministries, industry associations, etc. Published information is oftenout of date and contradictory; in addition, a large number of MSMEs are in the unorganised orinformal sector for which no "official" data is available. The informal sector plays an importantrole in the economy but its role is often poorly understood or appreciated.

While, there is some understanding regarding enterprises based on **"forest goods**", there is littleor no understanding of the status or potential of enterprises based on "**forest service's**" such asecotourism, carbon trading, watershed services, etc. There is a need to sensitise plannersregarding the potential of these services.

Considering the immense importance of MSMEs in improving the livelihoods of the poor as wellas forest resource management, detailed research is needed to understand the current situation,potential and various opportunities and constraints including policy bottlenecks. Such researchneeds to be carried out each commodity-wise (e.g. paper, medicinal plants and cosmetics, etc.)as often each commodity group has its own unique set of issues.

Log Quality and Wood Property:-

Commercial teak woods harvested from community plantations in Indonesia places like Gunungkidul, Wonogiri, Pacitan, East Nusa Tenggara and South East Sulawesi showed different quality when they were compared to the commercial teak wood harvested from the teak plantations of Forest State Enterprise, Perhutani. Generally teak logs from community plantations were smaller in diameter, higher portion of sapwood and occurrence of knots along the stem, poorer stem-form and more stem defects than those of Perhutani's plantation. Detailed observations on teak logs from community plantations revealed that heart rot occurred even the trees were still relatively young.

The average log diameter of the community-grown teak plantations in Java, for example ranged from 22.0 cm to 26.2 cm. This is much smaller than teak logs harvested from the Forest State Enterprise, Perhutani in Cepu which had the average diameter of 40 cm.

The heartwood portion was determined by measuring the area of heartwood compared to area of two cross section of the stem obtained from two ends of the log. The average heartwood portion of log from community teak plantations ranged from 52 % to 78 %. The average log with flute varied from 3.6 % to 51.3 %, while the average log with end split ranged from 23.1 % to 61.1 %. In comparison logs from Perhutani's plantations in Cepu had the average heartwood percentage of 72 %, the average log with flute of 17 % and the average of log with end split of 11 %. The high percentage of heartwood of teak log from South East Sulawesi is possibly related to the rapid growth of teak plantation in the area (see Table 4). Fast growth of teak is previously reported to correlate with high percentage of heartwood and strength (Bhat 2000, Bhat et al. 2001). The higher quality of teak log from Perhutani's plantation can be understood as the logs had larger diameter and were harvested from older teak plantations, normally at 60 years old, even tough at certain cases the harvesting age has been reduced to younger ages, around 40 years old.

Figure 9 shows samples of teak logs from different sites. The high percentages of sapwood (light color wood appearing in the outer portion of logs, near the bark) are attributable to small diameter logs and young ages when the trees were harvested. The heartwood portion was significantly lower than that of

teak logs harvested from Forest State Enterprise Perhutani's teak plantation which harvests its plantation at 40-60 years of age (Figure 10c). Prayitno (2001) studied the changes in teak wood quality of Perhutani's plantations and found that the decreased wood quality in its teak plantation was due to the cutting age. Older age teak trees having bigger stem diameter produced greater portion of heartwood. Okuyama et al. (2003) reported that the heartwood ratio was related to stem diameter not age.
In addition, log defects were found in logs harvested from community teak plantations, such as knot with variation of its diameter, flute, and heart rot downgraded the log. As a consequence, logs forms the community-grown teak plantations are sold at lower prices than those from Perhutani.



The low percentage of heartwood has a consequence, that is, the low price of the teak log. It could drop to one third up to one half of regular price of the log per cubic meter. For example, the price of Perhutani's teak log with the same diameter but having almost full heartwood could be sold at Rp 20 million, while that of teak log from community plantation is only Rp 6 up to 10 million per cubic meter. This situation becomes worse when the buyer already knows that the sapwood is not quite durable compared to heartwood. In the field the teak log price varies widely due to market mechanism, namely supply and demand of the teak log. When the teak supply falls short, the teak log price soars up, in contrast when the teak log is abundant then the price goes down.
Detailed information on the quality of logs coming from community teak plantations are presented below according to the location.

Wood property

Teak logs harvested from community teak plantations were collected from 5 locations, namely Gunungkidul, Wonogiri, Pacitan, East Nusa Tenggara and South East Sulawesi. The logs were then sawn to make samples for determining the physical and mechanical properties according to the ISO 1975 standard. Results of the assessment of wood properties are reported in details below.

Mechanical property

Teak wood is used for structural purposes in house constructions as well as in boat and ships. In order to assess if community-grown teak plantations have the required strength properties for those end-uses, mechanical strength of wood samples collected from 5 locations were determined.
Table 13 presents the results of assessment of mechanical strength of teak wood from different locations. Teak wood strength differed between locations. Generally, teak wood from South East Sulawesi showed greater mechanical strength compared to other four locations (Gunungkidul, Pacitan, Wonogiri and East Nusa Tenggara). The strength difference might be due to specific conditions of each location. Site condition and plantation management have been known to have pronounced effects on physiological

activities in trees, which in turn affect tree growth and wood quality. The mechanical strengths of teakwood originated from South East Sulawesi were 58.4 N/mm^2; 80.5 N/mm^2; 30.7 N/mm^2; 119.4 N/mm^2 and 11,537.8 N/mm^2 for compression parallel to grain, tension parallel to grain, shear, modulus of elasticity (MOE) and modulus of rupture (MOE), respectively.
An analysis of variance for mechanical properties reveals that the only factor affected significantly on the mechanical strength of teak wood was location. The location had profound influence on the structure and anatomy of teak wood which in turn resulting in different strength properties. The other factors such as axial positions (butt, middle and top portion of the stem) as well as radial position of sapwood and heartwood did not affect the mechanical strengthsignificantly. As mentioned in the preceding section the wood from South East Sulawesi had greater percentage of heartwood than other locations which contributed to the differences in mechanical strength

Physical property

The physical properties assessed in this study consist of wood specific gravity, shrinkage and swelling. Three factors were involved in the study, namely the locations of teak wood taken from the teak plantation, three levels axial positions (butt, middle and the top portion) and radial position (sapwood and

Table 19 presents the average wood specific gravity and shrinkage behavior of teak wood from different sites. Teak logs from five locations relatively had the same physical characteristics. The highest wood specific gravity was found in teak wood coming from South East Sulawesi. The oven dried wood specific gravity of teak wood from this area was 0.69 and decreased slightly when it was measured in air dry condition. On the other hand, the lowest wood specific gravity was obtained in teak wood from East Nusa Tenggara. The oven dried wood specific gravity was 0.55, while the air dry specific gravity was 0.53. Teak wood from Java (Gunungkidul, Wonogiri and Pacitan) had oven dry wood specific gravity of 0.63, 0.64 and 0.60 consecutively, while their air wood specific gravities were 0,60; 0.62 and 0.57 for Gunungkidul, Wonogiri and Pacitan

The higher wood specific gravity tends to have the higher wood strength. The lowest oven dry wood specific gravity in this study which was found in teak wood from East Nusa Tenggara, which had also the lowest wood mechanical strength. The highest wood specific gravity found in South East Sulawesi produced the highest mechanical strength.
Shrinkage behavior of teak wood from community plantations agrees with the universal rule of shrinkage and swelling. The highest shrinkage value from the green condition to oven dried state was at the tangential direction, followed by radial direction and the lowest was at the longitudinal direction. The tangential direction shrinkage was almost twice radial shrinkage. Among the five locations, Gunung Kidul and Wonogiri produced teak wood with high and similar shrinkage values, namely 2.40 %. The values of tangential shrinkage were 6.65 % and 5.76 % respectively for Gunung Kidul and Wonogiri. Pacitan had slightly lower radial shrinkage (2.27 %) and tangential shrinkage (5.86 %) than Gunung Kidul and Wonogiri.
A different result in wood shrinkage was found in teak wood collected from South East Sulawesi. Among five locations studied, it had the highest wood specific gravity in oven dry and air dry conditions, but the shrinkage values were relatively low. It was lower than the shrinkage values of teak wood from Java (Gunung Kidul, Wonogiri and Pacitan). The low shrinkage values were found in three directions, namely radial, tangential and longitudinal. It might be attributable to the high percentage of heartwood of the logs harvested from this area.
Earlier studies on wood shrinkage of teak wood taken from a 17 - year old plantation in Java reported that that the radial shrinkage was 2.19 %, while the tangential shrinkage was 3.55 %.

Wood Processing:-

In every area being surveyed there were teak wood processing units run by local people. They were typically small sized enterprises, traditional, and had low capital. Surprisingly there were many people involved in the teak log marketing and processing. Some were involved in marketing logs only, some were involved in marketing logs and processing, the others were involved in processing and marketing products. The small enterprises were generally initiated by the availability of opportunities, personal communication or family heritage. They have not been managed professionally.
Information gathered from the survey reveals that there were two types of enterprise working on teak wood. The first type is called teak log buyer. They are involved in buying trees from the community teak growers in the villages, collecting and putting logs in log yards and then selling the teak logs to wood

processors. The teak buyer usually owns log yard for sorting and piling logs. The second type is teak businessmen who are involved in teak log processing and/or producing end product of teak wood such as furniture, housing components and other ordered items. They have the wood processing site such as sawmill, drying facilities, and other processing machineries. Interviews were also carried out with the teak log buyers (first type of enterprise) to collect additional more information on log qualities.

Sawing technique:-


Figure-1a) b)

Examples of sawing tools used by small sized processor: (a) band saw, and (b) circular saw

Almost of the observed sawing techniques in the rural or community teak wood industries were traditional, and very simple. The log was reduced to all lumbers of tangential type. The advantages of this sawing technique are very fast sawing, efficient, and no time required turning logs for specific dimension of sawn lumber. All products of processing these tangential lumbers are for making furniture. However, the technique could produce lumber prone to defect such as splitting, bowing, and cupping.Some community industries used band saw for breaking down the logs, the others employed large diameter of circle saw (Figure1). The first sawing type is more efficient in processing and producing high yield, while the second one produces lower yield due to high sawdust waste. The data on the recovery rate of sawing is lacking. Most of the small sized processors did not assess the yield from sawing the log. Observations on the sawmill reveals that the recovery rate of most of the sawmill processing teak log form community plantation was low, below 40 %.

However, some industries, for example in Gunung Kidul have employed a relatively high technology of drying wood, which is so-called heating type by a wood heater (Figure 2 b and c). This drying technique is done by burning wood waste or lignocellulosic materials that is considered as waste in a box like burner and then the hot air is supplied to the drying chamber. The lumbers are stacked or piled in such a way that hot air could pass through the inter lumber space and could remove water from the lumber quite fast. This technique will shorten the drying time but if it is not done carefully would produce more percentage drying defects.

Figure-2a) b)

Drying techniques employed by Small sized processors (a&b):- By air drying for seasoning


(c) Hot- air drying for seasoning (d) hot-water drying for seasoning.

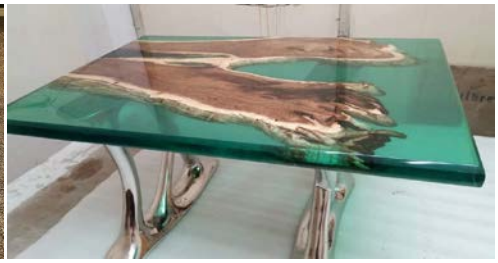
Manufacturing:-

Teak logs from community plantations were processed and manufactured by small sized industries mainly for furniture. Some are used for house components such as frame, door and window (Table 13). A very small percentage is used for light construction of houses. However, exact data on the end products are currently not available.


Figure1. Housing components and furniture made of teak log from community teak plantations by the Micro small Medium Enterprises Products for domestic market.


Teak wood Fabricated round blocks products from using new technology of Epoxies by wood making different design:-

a) Teak fabricated round blocks products of Eposes River Table;

b)  

c)  

2.13 Distribution Channels in India:-
There is a very high consumption in the western and the northern markets of India, viz, Mumbai and New Delhi, New Delhi being the leader. Market Structure of Furniture Industry,
MARKET STRUCTURE Organized sector ,Unorganized sector PART 3 COMMONEST MISTAKES IN EXPORT TO INDIA

PART 10 INFORMATION SOURCES: - Indo Italian Chamber of Commerce 502,
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By 2025 the Indian economy is projected to be about 60 per cent the size of the US economy. The transformation into a tri-polar economy will be complete by 2035, with the Indian economy only a little smaller than the US economy but larger than that of Western Europe.
By 2035, India is likely to be a larger growth driver than the six largest countries in the EU, though its impact will be a little over half that of the US. India, which is now the fourth largest economy in terms of purchasing power parity, will overtake Japan and become third major economic power within 10 years.

Executive summary:
The idea of India is gradually changing as number of countries showing interest to invest in India is increasing. According to an AT Kearney's FDI Confidence index, India has displaced the US as the second most favored destination in the world after China.
India attracted **FDI at US$7.96 billion** during the first half of FY06, as **against US$2.38 billion** during the same period in FY05, more than 3 times growth. India's economy is predicted to be growing over 8% in 2006 and with a billion plus population India has its wings of varied culture and business/industry scenario across the country.
At the backdrop of such characteristics prospective investors in any foreign countries will be interested to know 'Doing business in India in wine industry'. The study aimed at highlighting macro-economic

indicators of the country with its risk analysis in terms of currency, non-collection of goods and non-payment. It also discusses obstacles that the prospective investors may face and appropriate marketing strategies that they should adopt to ensure smooth landing in the country which requires a good understanding of its geographies and associated culture and business environment, least but not the last the market dynamics.
Approach taken for this study was to collect information/data from various authentic sources like industry associations, trade agencies and respective ministries wherever applicable. As far as policy/regulations are concerned respective ministries' reports and guidelines have been referred and an attempt has been made to explain them appropriately as relevant they may be.
Salient points which are key findings in this report are given below. Challenges in the market is still to find the right partner, knowledgeable about local market and procedural issues for foreign industries investment in India and can formulate the right strategies with solid foundation for setting up manufacturing base as JVs as the FDI policy may stipulate in respective sectors Tariffs (although tariff structure has been reduced considerably since economic reforms but issues still remain in some specific sectors) and poor infrastructure still poses a serious challenge to FDI.
In addition, heavily bureaucratic investment processes, poor IPR enforcement, government inefficiency, and corruption have also discouraged foreign investors. Winning strategy overcoming the market entry barriers for setting up an establishment- a solid regional plan analyzing the local market demand and economics that work out to be feasible in producing in India and exporting to other countries in the world leveraging conducive economic factors that otherwise become an impediment in future growth. While marketing products distribution strategy can really make the difference; however merit has to be given after due diligence is done and a meticulous plan should be in place.
Small distributors can really make a drastic improvement in sales growth where flexible marketing strategies play an important role.

A joint venture company is generally formed under the Indian Companies Act of 1956 and is jointly owned by an Indian company and a foreign company. This type of arrangement is quite common because India encourages foreign collaborations to facilitate capital investments, import of capital goods and transfer of technology. All industrial undertakings are exempt from obtaining an industrial license to manufacture, except for
(i) Industries reserved for the Public Sector,
(ii) Industries retained under compulsory licensing,
(iii) Items of manufacture reserved for the small scale sector and
(iv) if the proposal attracts location restriction.
Being a buyer's market from seller's market promotion of products matters much. The key to gaining rural market share is increased brand awareness, complemented by a wide distribution network. Rural markets are best covered by mass media - India's vast geographical expanse and poor infrastructure pose serious challenge for communication and hence emphasis must be given in communication problems to be really effective in selling to rural market.
India is still not holding its laws high for protecting copyright issues. As a result cases of counterfeiting and violation of copyright act happens and probably judicial system is still not being able to curb the menace. Adjudication of cases is extremely slow. Logistics play an important role in distributing products to all corners of the country. Due to its vast territory challenges in implementing a smooth supply chain model is really challenging and hence outsourcing to third parties is very common and an useful and effective strategy to reach market place just in time.

2.12 **Local against imported:-**

The major difference between imported products and the local products is that imported products have a better finish taking into consideration their use of modern technology and machinery. Also the products are stylish and ergonomically designed.

The quality of "up market" locally manufactured products is quite good but, at a cost. The quality of imported mass produced consumer durables are generally quite good however, the product life is quite short. There is a good demand for mass produced imported furniture as they could be purchased "off the shelf" and, could be used instantly. In comparison to prices the imported products cost more than the local product. Availability of the local product is good in comparison to the imported products however, recently this scenario is changing with furniture and lighting outlets multiplying in the mega cities and metros. Government does not allow FDI in single brand retailing for imported products in India whereas for the local products there are no such restrictions.
India's imports of sawn wood from countries with active sawn wood export restrictions (2010-2019)
Source: UN Comtrade 2019, compiled by Forest Trends 2020:-

India is poised to join China and Vietnam as a furniture-manufacturing hub, importing vast amounts of timber from all over the world and processing this wood into finished products. India's wood-based industries— comprising both large companies and millions of artisans and small and medium

enterprises—now export timber products valued at more than $1 billion,1 an increase of 138 percent by value since 2010.
At the same time, India's rural population continues to require vast amounts of fuel wood for heating and cooking, while the urban population is purchasing more furniture than ever before. Rising incomes and evolving tastes, such as an increased desire for "eco and nature-themed" design, mean that demand for wooden furniture and handicrafts is higher than ever. Where do all the raw materials to supply this wood products industry come from? Can Indian manufacturers guarantee that their products are legally sourced, let alone sustainable? Despite government efforts to raise domestic productivity, India's overall timber production remains low.
This is especially true for the tree species preferred by consumers such as teak, sheesham and pine. Demand for all forestry products surpassed the domestic supply in the mid-1990s and this gap is likely to have grown significantly since, particularly for high-value hardwood species (FAO 2007).
To meet this supply gap, Indian manufacturers have doubled their imports of raw materials in the past decade. Imports of raw materials will likely to continue to increase, as the Government of India considers incentives to boost the domestic furniture industry further, including through duty-free imports of raw materials and by banning furniture imports altogether following recent economic concerns resulting from the COVID-19 pandemic (The Economic Times 2020).
Unfortunately, many of the countries that now supply India with these raw materials suffer from high levels of illegal logging and associated trade. The International Union of Forest Research Organizations estimates that India was the third-largest importer of illegally logged timber in the world in 2016, after China and Vietnam (Kleinschmit et al. 2016).
While the government regulates the tax and phytosanitary regimes of the timber imports, as well as endangered species, India has not instituted any robust regulation to exclude the import of wood products harvested and traded in violation of the laws and regulations in the source country. Certification systems that could verify legality and/or sustainability are also not used widely.
Without such systems, there is no guarantee that India's exports of manufactured timber products are verified as legal. Yet more than three-quarters of India's timber product exports require such verification by law in the importing nation– a figure that rises to 90 percent for furniture alone.
The United States and the European Union are India's largest markets for timber products. Both now have laws in place to restrict the import of illegal wood and forest products and require verification of legal harvest. Australia, Japan, the Republic of Korea and Indonesia also have similar laws in place, to be followed soon by Vietnam, and Thailand.
Buyers in all these markets risk fines, penalties and/or prosecution if they cannot comply. Indian suppliers risk losing these markets to other countries that can provide the legal assurances requested.
This report summarizes India's domestic and imported timber flows in and out of the manufacturing industry, **SEPTEMBER 2020 INDIA'S WOODEN FURNITURE AND WOODEN HANDICRAFTS: RISK OF TRADE IN ILLEGALLY HARVESTED WOOD**
6.2 Regulated markets reflect countries and jurisdictions that have developed operational measures to restrict the import of illegal timber. As of 2020, this included the United States, Member States of the European Union (as well as the United Kingdom, Iceland, Liechtenstein, Norway and Switzerland), Canada, Colombia, Australia, Japan, the Republic of Korea, Indonesia, and Malaysia.
Some measures are more comprehensive in scope, implementation, and enforcement than others. and its exports to **key "regulated markets"2** – particularly those exports categorized as "**other wooden furniture**" (Harmonized System **(HS) code 940360**) and "other articles of wood" **(HScode 4421)** which make up 60 percent of India's timber product exports.
The analysis assesses the risk (based on species, and likely source country) associated with these exports. Detailed shipment record data for India's imports and exports were also assessed to further determine the extent to which imported or Indian-grown species are used in furniture and handicraft exported to regulated markets.

KEY FINDINGS;-
In 2019, India's furniture and handicraft manufacturers were primarily using timber species grown and harvested in India in exported products.

In Forest Trends review of detailed shipment records covering India's exports of HS code 940360 and 4421 to the United States and EU+EFTA (European Free Trade Association) countries, Australia, and the Republic of Korea, mango and acacia were most commonly referenced. While more than 60 percent of these shipment records listed no species information at all, this finding is supported by interviews conducted for this report that suggest exporters, particularly those supplying the U.S. and European markets, are predominantly using mango, acacia, and to a lesser extent, sheesham. This suggests that the findings presented are indicative of the current species mix used in India's furniture and handicraft exports to regulated markets. Both species are likely to be low risk and grown in Indian plantations. India

imported low volumes of mango and acacia between 2016 and 2019. According to detailed shipment records, all imported mango was sourced from China while 80 percent of imported acacia was sourced from Vietnam, 12 percent from Malaysia and 8 percent from low risk source countries
2. Imports are increasing, particularly for species such as teak, pine and oak, which are widely used in furniture and handicraft production. Indeed, India's spectacular economic growth and increased demand for timber products over the past two decades is already having a dramatic impact throughout the forests of the world, from as far afield as Gabon, South Sudan, Suriname, and Turkey.
3. Of India's timber imports in 2019, 42 percent can be considered as being at high risk of having been logged illegally. Indeed, 44 percent of logs, 42 percent of sawn wood and more than 75 percent of veneer imports were sourced from countries assessed as being at high risk for illegal logging based on governance, corruption and harvest indicators, or from fragile and conflict-affected states as categorized by the World Bank.
4. India's top 10 high risk source countries for logs, sawn wood and veneer in 2019 were Gabon, Ecuador, Brazil, Ghana, Suriname, Benin, Ukraine, Tanzania, Colombia, and Togo.
5. India's main source countries on the World Bank's list of fragile and conflict-affected situations for 2019 include Myanmar, Papua New Guinea, the Solomon Islands, Nigeria, Cameroon, South Sudan, Republic of Congo, Liberia, Sudan, and the Central African Republic.
6. India imported more than 250 species of logs, sawn wood and veneer between 2016 and 2019.3 From this, 171 species (i.e., 38 percent of India's log, sawn wood and veneer imports by value) were species assessed as Near Threatened, Vulnerable, Endangered or Critically Endangered on the International Union for Conservation of Nature (IUCN) Red List. A species listing on the IUCN Red List does not necessarily imply prohibition of trade, and endangered species may be perfectly legally traded. However, a listing on the IUCN Red List indicates rising scarcity, which increases the value of the timber species (and hence the risk of illegal logging). More research is required to determine the extent to which veneer is used in Indian-manufactured furniture.
7. Traceability and legality verification of Indian-manufactured furniture and handicraft products is a challenge. While there are a number of certification systems designed to verify forest management and chain of custody (CoC) systems, only a few furniture factories or artisans use them. Verification of imported timber legality is weak even for certified products.
The following species should be considered as being at potentially high risk when listed in Indian manufactured furniture and handicrafts:
1. Teak: While India has a significant area of plantation teak, the volume and quality of teak available is not currently sufficient to meet demand. More than 80 percent of India's teak imports over the past three years have been sourced from high risk source countries based on governance and harvest risk, or from fragile and conflict-affected states as designated by the World Bank. Imports from high risk countries, many with export restrictions in place such as Myanmar, Ecuador and Benin, have increased.
2. "Sheesham", "Dalbergia Sissoo", "Rosewood", "Indian Rosewood", "East Indian Rosewood", "Dalbergia Latifolia": Both Dalbergia species, if used in furniture and handicraft production, are likely to be sourced from Indian agro forestry plantations but both species are listed on CITES4 Appendix II, despite India requesting their removal from the listings in 2019. This request was rejected and therefore shipments containing Dalbergia species should be accompanied by a CITES-comparable document unless exempt from CITES regulations.5 As the Export Promotion Council for Handicrafts (EPCH) has been designated as the competent authority to issue the comparable document in lieu of the CITES permit, imports should be accompanied by a VRIKSH Shipment Certificate.
3. Mahogany (Khaya ivorensis): Mahogany (Swietenia spp.) grown in Indian plantations is generally low risk compared to imports from high risk or fragile and conflict-affected states such as Angola, Mozambique, Côte d'Ivoire, Ghana and the Democratic Republic of Congo (DRC). The African imports are likely to be Khaya ivorensis, categorized as Vulnerable by the IUCN Red List.
4. "Merbau" or "Vengai": India imported significant volumes of merbau/kwila/ipil between 2016 and 2019, primarily from three source countries: Papua New Guinea (69 percent), Indonesia (18 percent) and Malaysia (13 percent). There are reported risks of illegal logging in all three countries (Chatham House 2020). More than 80 percent of the wood-based trade from Papua New Guinea has been reported to derive from unlawful harvest (UNODC 2013). The IUCN Red List also reports the species as "Vulnerable" (IUCN 2020)
5. Ebony: Diospyros ebenum or Indian ebony grows in southern India but there are reports that India has banned its export. Indian companies imported low volumes of ebony (Diospyros spp.) between 2016 and 2019. One-quarter of imports were sourced from high risk countries or fragile and conflict-affected states including South Sudan, DRC, Gabon, Cameroon, and Nigeria. Around 50 percent was sourced from China. The remaining 25 percent was sourced from low risk European countries although Diospyros species do not grow in Europe, which means the timber was originally sourced elsewhere.
6. Red sanders/red sandalwood: Though red sanders/red sandalwood is listed on India's "prohibited" list of exports, some product categories are instead listed as "restricted" which means that their export is permitted in certain circumstances such as being harvested from cultivated land.

The report presents two main recommendations:

1. For governments in countries with laws regulating the import of illegal wood: This report finds that the majority of the potentially high risk species were listed in products exported under HS code 4421, which is outside the scope of many timber import regulations including the EU Timber Regulation, the Australian Illegal Logging Prohibition Act and the Japanese Clean Wood Act. In the case of the Republic of Korea, all wooden furniture products and HS codes as well as "other articles of wood" under HS code 4421, are currently outside the scope of products covered by the Korean Revised Act on the Sustainable Use of Timbers. As such, we recommend that the European Commission and the governments of Australia, Japan and the Republic of Korea broaden the scope of the products covered by their regulations to include all wooden furniture HS codes and "other articles of wood' under HS code 4421. Any government in countries currently designing regulations seeking to eradicate illegally logged timber from their markets should ensure that these products fall within the scope.
2. For the Government of India: Given that India's timber product exports are already vulnerable in regulated markets, and many furniture and handicraft artisans are likely to see increasing demands to verify that the timber they use is legal, we recommend that the Government of India develops a robust import regulation specifically designed to exclude the import of wood products that are harvested and traded in violation of the laws and regulations in the source country.
Introduction:-
India's furniture-manufacturing sector exported more than $1 billion of timber products6 in 2019, an increase of 138 percent since 2010. Domestic consumption of wood products has also risen as the country has undergone strong population growth, rapid urbanization and more than 270 million citizens have risen out of poverty since 2006 (Alkire et al. 2020). Abundant labour, low-cost operations by millions of artisan handicraft operators, and low shipping costs mean that India's furniture industry is now one of the most competitive in Asia (Sourcify n.d.). Despite government efforts to raise productivity, overall domestic timber production remains low, especially of the species preferred by the furniture and other manufacturing sectors. As a result, export and domestic demand for forestry products (primarily timber and fuel wood) surpassed the domestic supply capacity in the mid-1990s (Bit and Banerjee 2014; Ghosh and Bhaskar 2016). By 2006, the gap between consumption and supply of timber was conservatively estimated at about 25 million cubic meters (m3) (Ministry of Environment and Forests (MoEF) 2009). Estimating the current supply gap remains challenging due to the lack of reliable production and consumption data. However, the fact that import volumes have doubled over the past decade shows the gap still exists, and there continues to be a need to fulfill the volumes that cannot be met by domestic sources. Demand for raw materials sourced from outside India, particularly logs, pulp, veneer, and sawn wood, will likely to continue to increase as Indian government incentives aim to boost domestic furniture production and provide jobs following the COVID-19 pandemic.
Many of the countries supplying India with these timber products suffer from poor governance in their forest sectors, with a high risk of corruption, illegal harvesting and document fraud. The International Union of Forest Research Organizations estimates that India was the third-largest importer of illegally logged timber in the world in 2016, after China and Vietnam (Kleinschmit et al. 2016), and that it accounted for close to 10 percent of the global illegal wood trade. The Government of India has regulated several aspects of the timber trade such as taxes (e.g. customs duties or royalties), sanitary and phytosanitary conditions (e.g. plant health), restricted and prohibited products (e.g. log export and debarked wood bans) as well as endangered species. However, to date, India has not developed a regulation specifically designed to exclude the import of wood products harvested and traded in violation of the laws and regulations of the source country. More than three-quarters of India's timber products, and more than 90 percent of furniture products are exported to countries that now have laws in place to restrict the import of illegal wood and forest products – not just the United States and the European Union (EU+EFTA),7 but also Australia, Japan, the Republic of Korea, Indonesia, and soon Vietnam and Thailand. The United States and the EU+EFTA are the biggest globalconsumers of Indian timber product exports, with U.S. consumers alone buying 40 percent of India's timber product exports in 2019 (by value). Buyers in these markets are exposed to legal liabilities due to the risks associated with Indian timber products manufactured from imported, illegally sourced wood products; Indian exporters meanwhile risk losing their market access to these markets. This report outlines some of the risks associated with the potential for illegally sourced wood products to enter India's furniture and wooden handicraft supply chains.8 It synthesizes the latest available data on India's wood fiber production and its increasing reliance on imports. It assesses India's exports of two main products traded (wooden furniture9 and handicrafts10) and looks in depth at the exports to the "regulated markets",11 including the United States and the EU+EFTA as well as Australia, Japan, and the Republic of Korea. From there, the report analyzes the latest available import data on raw materials to assess the risk that illegally sourced timber could be entering furniture supply chains. Finally, the report summarizes the risks associated with India's furniture and handicraft exports. This report will guide subsequent field research in several Indian furniture-manufacturing centers.

India has not developed a regulation specifically designed to exclude the import of wood products harvested and traded in violation of the laws and regulations of the source country

International and Domestic Demand for India's Timber Products:-

2.0 India's spectacular economic growth over the past two decades, and its increased demand for timber products are having a dramatic impact throughout the forests of the world, from as far afield as Gabon, South Sudan, Suriname, and Turkey. Burgeoning domestic consumption, due to rapid population growth, urbanization and increasing income levels, in a nation with very limited per capita forest resources, has fuelled the rapid rise in India's imports of forest products. Growing global demand, particularly in the United States and Europe, for low-cost furniture products and India's trade liberalization policies have further fuelled its need for imported timber. India is increasingly competitive with other wood-manufacturing centers in Southeast Asia such as China and Vietnam.

2.1 Export Demand

In 2019, India's total timber product exports were valued at $1.13 billion, an increase of 138 percent since 2010.12 Major export products included wooden furniture, other articles of wood, wooden seating, logs, and marquetry, according to official trade data reported by the Government of India to UN Comtrade (United Nations 2020.

Exports have progressively increased while product lines and markets have diversified. India now exports timber products to an increasing number of developing and emerging economies. However, overall, the United States and the EU+EFTA markets continue to dominate, together accounting for more than 70 percent of India's timber product exports. The United States is by far the most significant market, consuming more than $1.2 billion in Indian-manufactured wooden furniture products between 2015 and 2019. Germany, France, the Netherlands, and the United Kingdom have each purchased more than $200 million in wooden furniture from India between 2015 and 2019. Belgium, Spain, Italy, Poland, and Denmark consumed slightly lower volumes during that time. A second tier of countries—China, the United Arab Emirates, Australia, Bhutan, Nepal, Canada, and Hong Kong—each accounted for between 2 and 4 percent of India's timber product export market. China, Nepal and Bhutan markets have grown 1,403 percent in the past 10 years, but from a very small base.

In 2019, the United States alone imported 40 percent of India's total timber product exports, a trade worth $449 million. Most (63 percent) of these exports to the United States were of wooden furniture. Other major timber product exports to the United States included other articles of wood (captured under HS code 4421 which also includes some wooden handicraft products), wooden frames for pictures, and marquetry – all of which have increased by export value since 2016.

Exports to EU+EFTA countries reached a new high in 2019, valued at $360 million, or 32 percent of India's timber product exports. Wood furniture, other articles of wood including some wooden handicraft products (HS code 4421), tableware and kitchenware, wooden tools, and marquetry dominate exports to the EU and EFTA.

In early 2020, the global market downturn due to the COVID-19 pandemic crushed India's export industry. Reported exports of all timber products fell 79 percent between January and May 2020, compared with the same five-month period in 2019. Exports of wooden furniture and handicraft products dropped 77 percent. Exports were down to all global markets.

2.2 **Domestic Demand**

A variety of factors lie behind India's burgeoning domestic demand for timber products. While recent estimates on current demand for timber products remain limited, social and economic shifts in India suggest that demand is increasing and evolving (Box 1).

The most obvious factor is the country's remarkable economic growth. India has had considerable success in reducing poverty—lifting 271 million people out of poverty in just the 10 years between 2006 and 2016 (Alkire et al. 2020). Per capita income rose by almost 32 percent in 2017–2018 compared to 2012–2013 (MoEFCC 2018).As of 2016, roughly 121 million households in India belonged to the middle-income bracket, earning a gross annual income of between $7,700 and $15,400. This figure is expected to increase to 140 million households by 2025, thus making India's middle class significant relative to its total population (Keelery 2018). Dual income-earning households, larger disposable incomes, and changing lifestyle trends among Indian consumers are driving increased consumer spending, including for furniture considered to be "higher-end" (Sood 2019). India's urban population is projected to grow to about 600 million by 2031 and 850 million by 2051 (MoEFCC 2018)

In addition, India's flourishing tourism and hospitality industry is reflecting evolving consumer preferences. A number of hotel chains are scaling up, even in smaller cities (Philip and Chaturvedi 2018). Increasingly, a large number of hotels are shifting away from décor and furnishings made from textiles such as carpets, turning instead to wooden flooring and the luxury spa atmosphere of natural "eco-

furnishings" (Hotelier India 2015; Sood 2019).These factors have all contributed to a sharp increase in the domestic demand for commercial forest products.
At the same time, millions of Indians in rural areas still rely on fuel wood for heat and cooking – and much of the country's forest production objectives have prioritized wood for household use as opposed to industrial timber production. India has one of the highest rates of demand for fuel wood in the world, accounting for almost 90 percent of all India's forest product consumption (FAO 2007; Shrivastava and Saxena 2017; Sood 2019).
Annual fuel wood consumption was estimated at 332.95 million m3 in the 2011 India State of Forest Report (MoEF 2011), but this decreased by around 5.46 percent between 2011 and 2019 (MoEF 2019).
Recent data on demand for timber products other than fuel wood are limited. The best estimates for India's timber consumption excluding fuel wood are only available for housing, furniture and agriculture. Combined, these uses are estimated to consume 33.61 million m3 of timber. However, researchers suggest that this could be a gross underestimation, considering that most wood markets, especially the panel, plywood and furniture industries, are fairly unorganized, and no official estimates are available (Shrivastava and Saxena 2017).
The Government of India's 2009 review of the forestry sector predicted that demand would reach 152.80 million m3 round wood equivalent (RWE) by 2020, comprised of: Short-rotation species: 87.70 million m3 RWE for species such as acacia, bamboo, poplars, and eucalyptus. Long-rotation species: 65.10 million m3 RWE for species such as teak (Tectona grandis), gurjan (Dipterocarpus turbinatus), makai (Shorea assamica), dhup (Canarium spp.), pali (Palaquium ellipticum), and poon (Calophyllum inophyllum) (MoEF 2009).
The Indian domestic furniture market is expected to grow at an annual rate of 12.9 percent during the period between 2020 and 2024 (Tandon and Tewari 2019). Other reports value India's furniture market at $61.09 billion by the end of 2023 (Panels and Furniture Asia 2019). IKEA, for example, has announced plans to open more than 25 stores across the country, with investments of more than $1 billion in stores alone (Tandon and Tewari 2019).
With new construction and renovations evolving towards wooden "eco-furnishings" and floors, demand has increased for engineered wood panel products such as plywood, particleboard, medium-density fibreboard (MDF), and oriented-strand board and laminated veneer lumber for construction and infrastructure projects as well as flooring products.

Consumer Concern Grows Over Climate Change and Unsustainable Consumption:-

Indian citizens are increasingly concerned about environmental issues and are becoming more aware of the role that industry can play in mitigating climate change and conserving the environment. A Tetra Pak Index study in 2019 in India showed that 71 percent of respondents believed that the world is heading towards an environmental disaster unless people change their daily habits (Tetra Pak 2019). Further studies released in 2019 show that 89 percent of Indian respondents believe that companies need to do more to address climate change, and that these businesses should be increasingly accountable for both their products and their corporate behavior (Mahindra Group 2019). Accenture's 2019 Global Consumer Pulse survey showed that 82 percent of Indian respondents prefer buying from companies that reflect their personal values (Tewari 2019). This suggests a potential shift in future consumer purchasing preferences towards companies with demonstrable ethical, legal, and sustainable sourcing practices.
India's Timber Supply: Domestic Production and Imports:-

In the 1980s, the Indian government began to rethink its previous forest sector policies, which had been focused primarily on timber production (Vanam 2019). Faced with significant forest loss and degradation, principles of conservation and sustainable forest management began to be integrated into new policies and programs. Timber production from government forest areas fell dramatically in the mid-1990s. This exacerbated the increasing gap between domestic production and overall demand (Indian consumers plus export markets), creating a need for increased imports to meet this demand. Despite increased imports, the supply-and-demand gap continued to grow. In the 2000s, the government recognized the need to balance the multiple objectives of increased production and supply of wood for subsistence fuel wood with a growing timber-processing industry which could employ thousands of people, while at the same time deliver high-level forest cover, biodiversity and climate commitments. Simultaneously, the approach of increasing timber production from trees outside forests (TOF) to meet domestic demand also gained importance. Reports suggest that domestically produced wood and bamboo contribute roughly 75 percent of India's total available annual supply (Shrivastava and Saxena 2017). Yet, with demand from both domestic and foreign consumers continuing to rise, and the government's desire to meet its forest restoration and conservation goals, India will likely increase its reliance on imports in years to come (Gopikrishna Warrier 2018)

3.1 Domestic Production:-

3.1.1. Policies and measures:-

The Government of India has promoted the conservation and restoration of forests and has offered incentives to increase timber production from areas outside the designated forest area. On conservation and restoration, the government passed the Forest (Conservation) Act in 1980, which reportedly slowed down the rate of conversion of forest land into non-forest purposes (MoEFCC 2018). This rate declined from 0.165 million hectares per annum (1951–1976) to 0.032 million hectares per annum (1980–2016). In 1999, the National Forestry Action Programme (NFAP) was developed to rehabilitate and increase the productivity of degraded forests, and also to increase the area under forest and tree cover, to ensure that 33 percent of the country is forested. The National A forestation Programme, launched in 2000, is expected to contribute between 15 and 20 percent of the overall a forestation effort with an emphasis on improving the quality and productivity of the existing forest cover (Lal 2000). The government launched various programs to rehabilitate degraded lands and watersheds. India has also complemented the reforestation policies by re-allocating tax revenues to states at least partially based on forest cover with the intention of incentivizing local governments to prioritize the reforestation of degraded land (Busch et al. 2019).

In 2015, the Government of India submitted its (Intended) Nationally Determined Contributions ((I)NDC) under the Paris Agreement, with a target of reducing overall emission intensity of its gross domestic product (GDP) by between 33 and 35 percent from 2005 levels by 2030 (UNFCC 2015). India ratified the Paris Agreement in 2016 with the NDC aiming "to create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030". This forest sector commitment is further detailed in India's Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategy published in 2018 which references the role of unplanned illegal logging and uncontrolled felling in driving deforestation, but which falls short of laying out policies to combat these drivers. Further strategies are forthcoming.

At the same time, the government has also sought to increase productivity of trees outside of forest. The National Forest Policy 1988 stated that "as far as possible, a forest based industry should raise the raw material need for meeting its own requirements, preferably by establishment of a direct relationship between the factory and the individuals who can grow the raw material by supporting the individuals with inputs including credit, constant technical advice, and finally harvesting and transport services". To minimize the pressure on India's forests and to meet industry's timber needs, the policy recommended import liberalization of timber and prohibited the export of unprocessed logs (Vanam 2019).
A commission on forests set up by the government recommended in 2006 that restrictions on felling on private land should be eased and should remain limited to "highly restricted tree species". Land ownership restrictions were lifted for plantations to encourage investment in larger agro forestry plantations. A report prepared by the Indian Institute of Forest Management (IIFM) as input to a Draft National Forest Policy in 2016 called for the need to "double the tree cover outside forests by the end of the next decade by incentivizing agro-forestry and farm forestry, facilitating assured returns with enabling regulations, and by promoting the use of wood products" (IIFM 2016). This report also recognized the need to encourage forest certification in India. The focus on "promoting sustainable use of wood" rather than "substitution of wood" has been lauded as a clear shift in approach (Vanam 2019).

3.1.2 Forest and forestland, and sources of production:-

India reported a 0.37 percent forest area annual net change rate in the FAO Forest Resource Assessment (FRA) 2020 (FAO 2020). A national increase of 3,976 km2 in planted forest has been reported between national assessments conducted for the India State of Forest Report (ISFR) in 2017 and 2019 (MoEFCC 2019).

States showing the most significant gains in forest cover are Karnataka, Andhra Pradesh, Kerala, and Jammu and Kashmir due to their conservation measures and forestation activities as well as local participation in protecting and managing planted and traditional forest areas (Sood 2019).

Manipur, Arunachal Pradesh and Mizoram states lost the most forest cover (MoEFCC 2019), reportedly due to shifting cultivation, biotic pressures (insects and diseases), rotational felling, diversion of forestlands for developmental activities, submergence of forest cover, agriculture expansion, and natural disasters (Sood 2019).

India's 72.16 million ha of forest cover is divided between 58.89 million ha of naturally regenerating forestland 13.27 million ha of planted forest (FAO 2020). Plantation extent13 was estimated at 10.04million ha in 2020.

In India, the natural forests are mostly state-owned and managed (NEPCon 2017a). While some state-managed plantation production is recorded from natural forest areas (Table 1), a significant volume of domestically produced wood and timber is sourced from trees outside the recorded forest area, mainly in the form of agro forestry plantations on private lands (Sood 2019). Wood production from these areas

has been estimated at almost 14 times the production from recorded forest areas (Shrivastava and Saxena 2017).

The extent of trees outside the recorded forest area was estimated for the first time in 2019 at 29.38 million ha (MoEFCC 2019). This includes trees from agricultural land (often species such as mango), farm forestry areas (often species such as eucalyptus, acacia, poplar, casuarina), social forestry areas which include roadside areas, as well as land around educational institutions, factories, railways, gardens, community lands and private lands such as estates. As such, government-owned and -managed forests, including state forest plantations, provide only a small portion of the total domestic timber supply.

The total growing stock of wood in India is estimated at 5.91 billion m3 comprising 4.27 billion m3 inside forest areas and 1.62 billion m3 outside recorded forest areas (MoEFCC 2019).

3.1.3 Productiondata:-

India's annual total wood production (including bamboo) has been estimated at 438.14 million m3 . When fuel wood production is excluded, this volume falls to 52.89 million m3 . 14 Recycled and reclaimed wood also contributes to the supply but the volume is limited (Vanam 2019). Table 1 presents the production breakdown. The majority of wood or timber produced in India is fuel wood, followed by saw logs and veneer logs (Figure 6). India produced around 200,000 m3 of MDF and 295,000 m3 of veneer sheets based on the latest available data reported for 2018 (FAO 2020).

Table 1. Annual estimated wood production in India (million m3)

Type	Production volume (Million M3)
Natural forests (excluding State Forest Development Corporations)	1.21
Natural forests (State Forest Development Corporations)	1.97
Trees outside recorded forest land	44.34
Bamboo15	5.38
Fuel wood	385.25

Source: Adapted from Shrivastava and Saxena 2017

States like Punjab, Uttar Pradesh, Gujarat, Jammu and Kashmir, West Bengal, Kerala, and Andhra Pradesh, North East India are among the leading suppliers of domestic wood for the manufacturing and processing industries, and particularly, the country's furniture sector (AHEC 2016).

3.1.4 Domestic species:-

The best available production data of species are reported by forest type: trees within the designated forest area and trees outside forest.

- Sal (Shorea robusta) is most widely grown in India and accounts for around 8 percent of India's total national growing stock.
- Mango (Mangifera indica) accounts for around 4 percent of the total volume of growing stock and is produced outside forest areas in agro forestry plantations.
- Teak (Tectona grandis) accounts for roughly 3 percent of national growing stock (Figure 7) (MoEFCC 2019). Other key species based on growing stock include:

- Pine (both Pinus roxburghii and Pinus wallichiana)
- Indian Laurel (Terminalia tomentosa)
- Neem/Indian lilac (Azadirachta indica)

3.1.5 Risk of illegality in domestic grown wood:-

Several legality risks are present in India, many of which are related to the legal rights to harvest and third parties' rights, non-payment of taxes and fees, and non-compliance with national laws

and regulations covering timber-harvesting operations, transport and trade (NEPCon 2017a). NEPCon's 2017 Timber Risk Assessment for India, the most comprehensive review to date, summarizes the legality risk as follows

a)**Rights to harvest**:-
- Non-recognition and violation of forest-dwellers' rights
- Forest encroachment and illegal logging conducted on land not under the legal tenure of Loggers, often supported by government official corruption
- harvesting without a permit
- over-harvesting on permitted volumes

b) **Taxes and fees**:-
- Private businesses not paying the correct royalties and harvesting fees
- Widespread VAT evasion and corruption in the implementation of VAT laws
- Non - declaration/under-reporting of incomes and profits
-corruption among tax authorities

c) **Timber-harvesting activities**:-

- illegal harvesting within protected areas
- protected species being illegally harvested due to the prevalence of illicit logging and corruption among government officials

Violation of labour laws, such as non-payment of minimum wages, use of child labour, and incidences of bonded labour have also been reported as risks.

3.2 Imports:-

The total annual volume of imported timber has been estimated at 18.01 million m3 or roughly 25 percent of India's total available supply (including bamboo) based on 2015 import data.16 India's imports of timber products and pulp have almost doubled in value over the past decade (Figure 8). While still early to determine the full impacts of COVID-19 on global timber trade, India's reporting for the period January to May 2020 shows that total timber and pulp imports were down 82 percent by value compared to the same five-month period in 2019. This includes an 84 percent drop in log imports and an 82 percent decrease in both sawn wood and veneer imports. Imports were down from all major source countries. Several industry studies estimate that India's imports will continue to increase as domestic and export demand continue to build, and as government incentives encourage the domestic furniture industry. Rising imports reflect increasing overall demand for raw materials as well as an increasing demand for new imported species (Sood 2019). Shrivastava and Saxena estimate an annual volume increase from 18.01 million m3 based on 2015 data to 22.51 million m3 by 2020; to 27.91 million m3 by 2025; and reaching 31.5 million m3 by 2030 (2017).

The main products imported into India since 2010 include pulp, logs, sawn wood, and veneer to support a growing construction, manufacturing and processing industry. Together, these four products accounted for 79 percent of India's forest product imports by value in 2019. Log imports have been declining since 2014. Sawn wood and veneer imports have been slowly increasing

India's imports of logs have declined dramatically by 50 percent since 2014 (Figure 10), with a particular shock in 2014 and 2015 when the Governments of Myanmar and Lao People's Democratic Republic (Lao PDR) began to enforce log export bans, or due to reduced log export quotas, such as Malaysia imposed on its exports. Declining availability and rising costs of logs from the state of Sarawak have reportedly led a number of Indian companies to look outside Malaysia to other log suppliers. The top source countries since 2010 have been New Zealand, Malaysia, Suriname, Papua New Guinea, Costa Rica, Ghana, Ecuador, and the Solomon Islands, which together accounted for 69 percent of log imports by value in 2019. In 2013, prior to log export restrictions in key markets, Myanmar, Malaysia, and New Zealand supplied 75 percent of India's log imports. By 2019, India reported just 35 percent of log imports from Malaysia and New Zealand, and none from Myanmar. Over this time period, Indian log importers have switched sourcing away from Myanmar and Malaysia to Singapore (a country with no commercial forests), Brazil, the Solomon Islands, Suriname, Ghana, Panama, and Ecuador, which now supply 40 percent of India's log imports

As log imports have declined, Indian companies have increased their sawn wood imports by 723 percent between 2010 and 2019. However, the total values of these sawn wood imports remain well below the

values of total log imports (Figure 11). Malaysia is a key source country for sawn wood, along with Germany, Myanmar, Indonesia, the United States, and Brazil. As log imports have declined, Indian companies have diversified sawn wood imports from new countries, particularly Côte d'Ivoire, South Sudan, and Lithuania, as well as Papua New Guinea, Ecuador, Singapore, Ukraine, Sweden, and Benin.

Decorative hardwood sawn timber was initially imported from the United States and Canada but increasing imports of sawn timber from Malaysia, Indonesia, and Myanmar have been significant. This has particularly been the case in the past five years as the import duty on sawn timber from the Association of Southeast Asian Nations (ASEAN) countries has fallen to zero, which has significantly impacted Indian sourcing

Indian companies increased veneer sourcing from Asia by 1,510 percent between 2010 and 2019. There was a rapid rise in sourcing from Myanmar and Indonesia after 2014, and a more recent spike in sourcing from Gabon in 2018 and 2019 following mill investments by Indian companies from 2013 in Myanmar (Moe 2014) and from 2016 in Gabon (ITTO 2016). Seven countries supplied 90 percent of India's veneer imports in 2019: Gabon, Myanmar, Indonesia, China, Vietnam, Italy, and the United States. Gabon alone now supplies one-third of India's total veneer imports.

3.3 India's Import-related Risks of Illegal Deforestation

Poor governance and corruption have been shown to correlate frequently with the failure of a country's public sector to enforce relevant laws or regulate industries effectively (Forest Trends 2017c). Nearly half of the world's forests are in nations with what Transparency International calls "rampant" corruption (Sundstrom 2016). Most of the forest crimes identified by Interpol and the United Nations Environment Programme (UNEP) result from the inability of state forest administrations to enforce laws that regulate timber harvesting and trade (Nellemann et al. 2016). The complicity of government officials in corruption in many states undermines the enforcement of laws and regulations relating to forest protection and management, and the reliability of chain of custody systems. This suggests an increased risk of buying illegal wood.

In addition, fragile and conflict-affected states face particularly severe development and governance challenges and are characterized by weak institutional capacity, ineffective rule of law, political instability, and the threat or reality of ongoing violence at variable scales. As a result, political instability and violence inherent in these states raises the likelihood of buying illegal timber by a significant measure (Forest Trends 2017b; Forest Trends 2020).

In general, forest crimes and illegal logging in many timber-producing countries are not well documented, and consistent global data on illegal logging do not exist (Forest Trends 2017c). By its very nature, as an illicit act, the extent and nature of illegal logging are difficult to monitor systematically, and efforts are taken to hide i

Forest Trends has also developed a risk assessment approach that follows a growing body of work using existing data and metrics related to national governance, corruption, conflict, and harvest-risk indicators to highlight the likelihood that timber may have been illegally logged in a source country, or the likelihood that illegal wood may have entered a supply chain.18

As such, to understand the risks associated with India's imported timber, this report therefore draws on three main and inter-related "risk" categories: (a) political governance and conflict risk; (b) species risk; and (c) risk of export in violation of source country restrictions.

3.3.1. Political governance and conflict risk associated with India's imports::-

Around 42 percent of India's timber imports in 2019, including 44 percent of logs, 42 percent of sawn wood and more than 75 percent of veneer imports, were sourced from countries assessed as being at high risk of illegal logging and trade based on governance, corruption and harvest indicators, or from conflict states as categorized by the World Bank (Figure 13). This suggests significant risks that illegal timber could be entering supply chains via imports, including in furniture and handicraft products manufactured in India.

India's top 10 high risk source countries for logs, sawn wood, and veneer in 2019 were Gabon (Box 2), Ecuador, Brazil, Ghana, Suriname, Benin, Ukraine, Tanzania, Colombia, and Togo.

India's main source countries on the World Bank's list of fragile and conflict-affected situations for 2019 include Myanmar (Box 3), Papua New Guinea, the Solomon Islands, Nigeria, Cameroon, South Sudan, Republic of Congo, Liberia, Sudan, and the Central African Republic

Indian imports from Gabon, particularly of veneer, have been rapidly increasing since 2018, and Indian companies have invested heavily in facilities within Gabon itself, settling in special economic zones (SEZ) and building sawmills, kiln-drying facilities, and furniture, veneer and plywood manufacturing units (ITTO 2016). In the Nkok SEZ, 17 out of 96 industrial investors in 2016 were from India. Gabonese species such as oukumé have only recently been accepted by the Indian market for panels and ply veneers, replacing imports from countries such as Indonesia, Papua New Guinea, and the Solomon Islands (Global Wood Markets Info 2017).

Gabon's forestry sector has long been critiqued for lacking transparency; public information on production, exports, and legal compliance with national legislation by licensed logging companies is scarce. NGOs continue to document sector-wide illegalities, widespread corruption, and illegal timber being sold on international markets.

Brain forest, a Gabonese NGO, and the Environmental Investigation Agency (EIA) have released reports, in 2010 and 2019 respectively, presenting detailed evidence of sector-wide illegalities including tax evasion, money-laundering and corruption, as well as overharvesting (EIA 2019). Crackdowns by the Gabonese authorities targeting a dozen companies in 2017 exposed further evidence of illegality in the sector, including the illegal felling of protected species. In 2019, Gabon's president sacked the vice-president and forestry minister over a timber-smuggling scandal surrounding the seizure and subsequent theft of containers of kevazingo (Dewast 2019).

These combined governmental and NGO initiatives highlight how sourcing timber from Gabon continues to be high risk.

In recognition of the challenges, in 2018, Gabon's president declared that all forest concessions operating in Gabon will have to be certified by the Forest Stewardship Council (FSC) by 2022 (FSC 2020). The government has estimated that with these new measures, the sector will increase its contribution to GDP from 500 million euros to 3,000 billion euros by 2025

Reported Illegal Logging Risks in Myanmar:-

Myanmar has the largest area of natural teak forests in the world – almost 50 percent of the 29 million ha across the globe. Until the Union Government of Myanmar (UGoM) instituted a log export ban and significantly reduced the annual allowable cut (AAC) in its teak forests (FAO 2015), Myanmar was the number one producer and exporter of teak logs in the world.

Yet there are significant reports of corruption, weak forest governance and law enforcement in Myanmar's forest sector (EIA 2019). Illegal harvesting in conflict areas such as Kachin State (EIA 2015); irregularities associated with forest conversion for all species (World Bank 2019); human rights violations (UNHRC 2019); and the mixing of timber from unknown sources has been reported (NEPCon 2017b; Forest Trends 2013; European Commission 2017; UNEP-WCMC 2018). In 2018, the European Commission and EU Member States jointly developed a common enforcement position, concluding that it was impossible to buy teak from Myanmar that complies with European Union Timber Regulation (EUTR). This position has been maintained ever since. Strong concerns have been raised regarding "the high level of corruption in Myanmar, in particular in the context of forestry, the exclusive forest ownership by the State and management by the State-owned enterprise MTE [Myanma Timber Enterprise] of natural forests, and the high value of teak grown in the wild …[This means that] … Myanmar remains a high risk country of harvest….The State itself is at risk of being in contravention of the law" (European Commission 2019). A number of EU Member States have started seizing Myanmar teak and/or returning shipments to both Myanmar and countries within longer supply chains such as India (Forest Trends 2020).

The 2018 FSC National Risk Assessment for Myanmar identified a wide range of key risks including: illegal assignment of harvest permits; illegal conversion of forest areas to agriculture; avoidance of paying royalties, harvesting fees and taxes; violation of forest management laws, regulations and rules; conflicts over land resources and involving Indigenous Peoples; and the falsification of documents which are all paper-based (FSC 2018).

India–Myanmar trade historically teak has been a key import species for India, sourcing close to one-third of all log imports from Myanmar between 2010 and 2014. However, since April 2014, the UGoM enacted a log export ban and reduced the AAC. Subsequently, Indian companies began investing in basic mills within Myanmar itself as well as diversifying their sources of teak, eventually sourcing teak logs, sawn wood and veneer from more than 50 countries between 2016 and 2019. Indian buyers also began to source other Myanmar species. Until 2018, India continued to report some log imports from Myanmar in contravention of the export ban; today, sawn wood and veneer imports have increased significantly. Through a detailed assessment of shipment record data, Forest Trends found that Indian companies imported more keruing (Dipterocarpus spp.) than teak (based on value) between October 2016 and September 2019. Nearly 60 percent of India's log, sawn wood and veneer imports from Myanmar were described as keruing. Teak accounted for 28 percent of India's imports from Myanmar (by value) over the period, with pyinkado (Myanmar Ironwood, or Xylia xylocarpa) accounting for 12 percent of imports.

Timber that does not transit through Yangon for export is illegal under Myanmar law. India and Myanmar share a land border including two main border crossings with customs stations: Tamu, Sagaing in Myanmar to Moreh, Manipur, India; and Rih, Chin State in Myanmar to Zokhawatar, Mizoram in India

A recent report suggests that the quantities passing by land into India were likely to be relatively small due to the remoteness of the border region with its inadequate infrastructure for transporting wood products. However, respondents in the study did confirm an informal trade of timber crossing the border at night, with traders mainly operating from Manipur with timber illegally sourced from protected forests (Maria-Sube and Wood gate 2018).
The Governments of India and Myanmar signed a Memorandum of Understanding in February 2020 aimed at Cooperation on Combating Timber Trafficking, and Conservation of Tigers and other Wildlife, but at the time of this report, little detailed information was released other than that training of Myanmar officials would be involved (GoI 2020).

4. Furniture and Handicrafts Industry:

India's furniture industry includes a few large companies which are well organized, but 90 percent of the industry is small-scale or "unorganized" (Hashmi 2012), where most wooden furniture, joinery, and other household products are made to order by small workshops or individual artisans. The Association of Furniture Manufacturers and Traders reports that the organized large furniture industry has been growing 20 percent annually (Financial Express 2018). Companies include Nilkamal Limited, Godrej & Boyce Manufacturing Co. Ltd., Zuari Global Ltd, Wipro Enterprises Ltd., Furniturewalla, Featherlite, Millennium Lifestyles, Urban Ladder, Damro, Pepperfry and IKEA. There are little to no data on the SME and artisanal subsector growth. The furniture-manufacturing industry was estimated to employ roughly 4.1 million workers in 2013, concentrated in manufacturing centers in Maharashtra, Gujarat, Uttar Pradesh, Bihar, and West Bengal (AHEC 2016). The National Skill Development Corporation in India states that the industry will require 11.3 million skilled workers by 2022 (The Economic Times 2015)

Some of the most common varieties of wood used in handicrafts and furniture include: teak, sheesham, sal, oak, mango, and mahogany

4.1 Species Used in Furniture Production

Nearly one-third of all handicrafts manufacturers reportedly use reclaimed wood (AHEC 2016). Some of the most common varieties of wood used in handicrafts and furniture include: teak, sheesham, sal, oak, mango, and mahogany. Sandalwood, ebony, rosewood, and walnut are considered exotic varieties and are highly expensive raw materials. All of these species are both grown domestically within India and are also imported (see Section 3; Table 2; and Box 4). Teak is reportedly the most commonly used species in wooden furniture production in India. Artisans working in the furniture and handicrafts sector are accustomed to and prefer teak and other hardwoods that are perceived to be more resistant to termites and decay. Indian consumers have historically had a strong preference for dark tropical woods.

Teak is typically seen as a benchmark with respect to grade and price, as compared to other wood species (Sood 2019). Government figures suggest that as much as half of the furniture manufactured in India uses teak; 30 percent is manufactured from mango, sheesham, mahogany, and cedar; and roughly 20 percent from sal (EPCH 2017).

The reported scale of teak usage in furniture is particularly at odds with what this report found through analyzing India's furniture exports. Just 1 percent of India's global exports of HS code 940360 listed teak as a component species. Given that a high percentage of export shipments did not list a species, it is possible that a higher proportion of shipments could contain teak. However, it is also possible that a much higher proportion of teak furniture remains on the Indian domestic market where it is a popular material particularly in western and southern regions of India (EPCH 2017

Main species used in Indian manufactured furniture and handicraft production2

Species Name Other common name(s)	Scientific name of species grown in India Geographic extent within India	Volumes and risk assessment of imported species (listed on shipping manifests Oct 2016-Oct 2019)* *Based on 97 percent of imports by value listing a species	Species risk: CITES and IUCN Red List

Mango	Mangifera indica Grown throughout India	Very low imports by value Low risk: 100% China (plantation)	Not listed
Teak	**Tectona grandis Throughout central , NER and southern India**	**Large volume of imports by value High risk: 80% from high-risk countries or conflict states, even when plantation teak**	**Not listed**
Pine	Pinus wallichiana, Pinus kesiya Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, Uttarakhand	Large volume of imports by value: Pinus radiata, Pinus sylvestris and Pinus spp. Low risk: Majority sourced from low risk countries High risk: 4.45% sourced from high risk countries such as Ukraine and Russia	IUCN Red List: Pinus wallichiana Least Concern Pinus kesiya Least Concer

Red sanders or red sandalwood (Pterocarpus santalinus) is endemic to several districts in Andhra Pradesh and some parts of Tamil Nadu and Karnataka in India (Arunkumar and Joshi 2014). Traditionally, the wood has been in high demand for furniture, and for medicinal uses, particularly for domestic markets as well as international markets such as China and Japan.

Overexploitation to meet domestic and international demand prompted the Government of India to recommend inclusion of red sanders under CITES protections in the 1980s. In particular, prices on the international market were double than when sold domestically. Red sanders were listed in Appendix II of CITES in 1995, and the Government of India subsequently banned export in 2004. Individual states regulated the domestic trade of red sanders through a process of multiple permits (Kukreti 2018).

In 2010, the Indian government submitted a **Non-Detriment Finding** (NDF) requesting permission to export from cultivated sources. India set a CITES annual export quota21 for red sanders which meant that 310 metric tons of red sanders obtained from "artificially propagated" sources (grown on farms) could be exported annually. Farmers are allowed to "artificially propagate" red sanders but require a permit for harvesting and transportation – a permit which has been reportedly difficult to obtain.

The Directorate General of Foreign Trade (DGFT), an agency of the Indian Ministry of Commerce and Industry, has a 2018 export policy which includes product-specific rules for all Indian Tariff Codes (ITC), although a 2019 policy has been drafted and is under discussion.

Under the 2018 policy, the export of red sanders wood in any form is "prohibited" yet certain value-added products are listed in the "restricted" category and therefore can be exported with a license.22 to permit export, the Indian government requires that the red sanders wood is procured from legal sources, including red sanders obtained from cultivated land (Kukreti 2019). Log exports of red sanders are prohibited; however seized logs are exempted depending on the regulations of the individual Indian state government, which vary. While there have been large, widely publicized national government seizures of volumes of red sanders logs in recent years, more research is needed to understand the documentation needed for seized logs to be legally exported.

Thousands of metric tons of red sandalwood logs and other timber products have been smuggled illegally out of southern India in recent years with a recent seizure of 8 metric tons of illegal red sander logs by Malaysian Customs in July 2020 highlighting the continuing illegal trade (TRAFFIC 2020)

4.2 Materials Used in Furniture Production:-

This desk-based study was not able to determine the proportion of India's furniture exports that are solid wood or are constructed using engineered wood. Indian producers have traditionally used wood panels but there are now calls to increase the use of MDF as a substitute for local plywood and particle boards. Globally, MDF is used in 80 percent of furniture but India has only used MDF in 20 percent of furniture to date (Panels and Furniture Asia 2018). From analysis of detailed shipment level data, Forest Trends found that at least 12 percent (by value) of India's exports of HS code 940360 "other wooden furniture" reported MDF in the product description

4.3 Location

Rajasthan and Uttar Pradesh states have the largest number of furniture manufacturers (EPCH 2017). Some of the prominent centers for wooden handicrafts and furniture production are summarized in Table 3. They include Saharanpur and Nagina in Uttar Pradesh, Hoshiarpur and Amritsar in Punjab, Jaipur and Jodhpur in Rajasthan, Srinagar in Jammu and Kashmir, Jagdalpur and Behrampur in West Bengal, Chennapatna and Chennai in Tamil Nadu, Bengaluru and Mysore in Karnataka, and Ernakulam and Cochin in Kerala. Jodhpur in Rajasthan now has a strong presence in the international wooden furniture markets

Furniture and handicraft hubs in India

State/District/Cluster	Crafts
Srinagar - Jammu & Kashmir	Walnut & Deodar Wood Craft
Saharanpur - Uttar Pradesh	Wood Carvings Furniture, Screens
Nagina - Uttar Pradesh	Wood Carvings Boxes
Jodhpur - Rajasthan	Wooden Handicrafts, Furniture & Giftwares
Kolkata - West Bengal	Wooden Furniture & Giftwares
Kondapalli - Andhra Pradesh	Wood (Turning and Lacquer Ware)
Chennapatna - Karnataka	Wood Inlay Articles
Chennai - Tamil Nadu	Wooden Handicrafts Antique Finish
Quilandy - Kerala	Coconut Wood/Coconut Shell Gift Articles
Trivandrum - Kerala	Rose Wood Carvings Gift Wares
North East Region	Cane & Bamboo - Furniture and other Home Utility Products

Source: EPCH 2017

4.4 Jodhpur as the Main Hub for Furniture Exports to the United States and Europe:-

More than 50 percent of India's furniture exports to the United States and the EU+EFTA countries in 2019 came from Jodhpur. Around 75 percent of the handicrafts produced in Jodhpur were made from wood, including small gift articles, carved items, toys, and furniture.

More than 500 handicraft-manufacturing units are concentrated in Jodhpur itself, with about half focused on export markets (TRAFFIC India n.d.).

Only about 10 percent of these handicraft exporters import raw materials. For those that import materials, species include teak and oak. MDF is imported mostly from Malaysia and New Zealand. A review of the Jodhpur handicraft industry found roughly one-third of operators using sheesham (Dalbergia sisso) which is often sourced from Sri Ganganagar in Rajasthan, Uttar Pradesh, Punjab and Bihar (TRAFFIC India n.d.).

Only large manufacturers of handicrafts are found to import wood materials from other countries, purchasing imported raw materials through agents in Delhi.

4.5 Other Manufacturing Centers:-

Forest Trends analyzed shipping manifest data for India's 2019 exports to regulated markets. This showed that other key centers include Delhi (accounting for 18 percent of India's exports of HS codes 940360 and 4421 to the United States and 3 percent to EU+EFTA in 2019); and Jaipur (12 percent of exports to the United States and 24 percent of exports to the EU+EFTA).

Mumbai and Bangalore, while only accounting for 1 percent of India's 2019 exports to the United States and 0.6 percent of exports to EU+EFTA countries, were most likely to export teak "other wooden furniture". Mumbai produced the most teak furniture exported to the United States in 2019. More than 60 percent of HS code 940360 "other wooden furniture" produced in Bangalore and exported to the United States included teak. The other 40 percent of export manifests did not include any species information. Together Mumbai and Bangalore produced more than 60 percent of the teak furniture under HS code 940360 exported to EU+EFTA countries in 2019.

Jaipur and Sikar in Rajasthan were key centers for production of "other wooden furniture" using sheesham and accounted for almost 60 percent of India's exports of sheesham furniture under HS code 940360 to both the United States and EU+EFTA countries in 2019. All of the exports originating from Sikar reported sheesham as the main furniture component

4.6 Certification

While there are a number of certification systems in use in India today, only 521,680 ha of Indian forest area were reported as certified in 2018, predominantly under the FSC or the Programme for Endorsement of Forest Certification (PEFC 2020; FAO 2020c). While there are also several chain of custody certification systems, only a few furniture factories or artisans use them. Where they are in use, the Indian standard VRKISH, and the international standards of FSC and PEFC, are most common. Interviews conducted for this study suggest that while quite a few companies have been obtaining VRKISH certification over the last few years, this concerns still a relatively small proportion of companies overall (Box 5). These standards have varying levels of robustness and scope.

As of June 2020, 750 companies were FSC Chain of Custody (CoC) certified. This is still a relatively low number (roughly equal to the number of CoC certificates for Hong Kong), considering the market size in India.

PEFC is represented in India through the Network for Certification and Conservation of Forests (NCCF), which developed national forest management certification standards endorsed by PEFC International in 2019 (PEFC n.d.). Around 40 companies were PEFC CoC-certified as of June 2020.

The large numbers of SMEs working in the timber industry have reported significant challenges in demonstrating the legality of their timber, despite acknowledging how certification is critical for a growing number of their export markets (EPCH 2017).

In 2017, the Export Promotion Council for Handicrafts (EPCH) was also added to the list of CITES management authorities competent to issue comparable documentation in relation to trade in specimens of Dalbergia spp. included in Appendix II (Dalbergia sisso and Dalbergia latifolia), demonstrating that their products are manufactured from timber that has been legally acquired.

E.g. (VRIKSH):-

The Export Promotion Council for Handicrafts (EPCH) developed the VRIKSH standard in 2014 to support the exporters of wooden handicrafts in India supplying European and U.S. markets (VRIKSH n.d.). VRIKSH is designed to certify the legal right to harvest and trade as well as compliance with local legislation, all taxes and royalties, and all other requirements for the trade and export of domestically produced timber. Companies receive certification for a five-year period that is subject to an annual surveillance audit. As of July 2020, there were 218 valid certificates for VRIKSH-certified exporters (VRIKSH n.d.) While the VRIKSH legality assessment and verification standard includes provisions to ensure timber has been legally imported, importers are only required to make documents available detailing the source country and species, the value of the timber and a phytosanitary certificate in addition to other regulatory documents which are not further detailed. In general, the VRIKSH system is designed to show that companies are able to trace their product from the forest all the way to individual consignments through a series of checks and balances. Barber and Winfield note that this is a document-based system which could be vulnerable to fraud, as they were "unable to determine whether anyone can actually verify that the wood in a particular shipment actually CAME from where the paperwork says it comes from" (CITES 2019). There remains a risk that VRIKSH-certified products may have been harvested from areas other than noted in the paperwork. Robust, third-party certification can be considered as a tool to help mitigate high risk sourcing but should not constitute sufficient due diligence for legality in and of itself. Under the EUTR, for example, certification or other third-party verified systems may be taken into account in the risk assessment and risk mitigation, but these do not grant automatic compliance. The U.S. Lacey Act, for example, is a fact-based statute with strict liability, which means that only actual legality counts and no third-party certification or verification schemes can be used to "prove" legality under the Act.

India's Exposure to Environmentally Conscious Markets

India's exports are overwhelmingly destined for countries that have already taken action to develop import regulations designed to exclude illegally logged timber from their markets. By 2019, 78 percent of all timber productsand 92 percent of wooden furniture products were exported to countries with import controls in place designed to exclude illegal timber from their markets

Trade to Markets with Regulations Designed to Exclude Illegal Timber

Regulations to tackle the trade in illegal wood have now been operational for several years across the EU (through the EUTR), in the United States (through the U.S. Lacey Act) and in Australia (through the ILPA). Implementation and enforcement modalities are well established (Forest Trends 2017a). More recently, Japan and the Republic of Korea have developed regulations to exclude illegal wood imports, while Indonesia, Vietnam and Thailand have committed to exclude illegal timber from their imports as a key component of the timber legality assurance systems that underpin Forest Law Enforcement Governance and Trade (FLEGT) Voluntary Partnership Agreements (VPAs) (Forest Trends 2019).

Species in India's Exports to Regulated Markets

Forest Trends analyzed all detailed shipment record data for India's two main timber product exports to regulated consumer markets in 2019 (the United States, EU+EFTA, Australia, Japan, and the Republic of Korea). These two exports – "other wooden furniture" (HS 940360) and "other articles of wood" (HS 4421) which includes a number of wooden handicraft products – constitute more than 60 percent of India's timber product exports.25 The aim of the analysis was to assess the risk (based on species, and likely source country) associated with the main products exported by India to regulated markets in 2019. From this, Forest Trends was able to determine the extent to which Indian exporters are likely to be using domestically grown and harvested species, or species imported from other countries.
Shipping records contain more information than public international trade datasets such as UN Comtrade or Eurostat. For example, shipment record data provide information on the importer, supplier, port and the product through a description field, which may include information on the species. These detailed data therefore allow a more comprehensive analysis of the species used in products that are destined for markets such as the United States and the EU+EFTA. While some of this information is collected by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) through the Lacey Act declaration requirement, or by Customs Authorities, the data are not made publicly available.

The Government of India, as well as other governments in consumer countries, do not mandate exporters to list species information on shipping manifests, except for products produced with CITES-listed species. Thus, some of the shipment record data do not list information on species, while other shipment records provide detailed information on one or more species, typically in the product description section. Where shipment-level species information is listed, these manifests are often incomplete and misleading, and there have reportedly been frequent seizures of wood exported illegally from India due to false customs declarations (NEPCon 2017a). Incorrect specification of species, quantity and quality of forest products are commonly used to evade taxes and tariffs, and possibly import regulations like the U.S. Lacey Act and the EUTR (NEPCon 2017).

Shipments to the United States

Forest Trends analyzed the detailed shipment records of all 111,508 shipments of HS 940360 and all 68,389 shipments of HS 4421 exported to the United States in 2019

a**) Other wooden furniture (HS 940360):**
-20 species were referenced in the shipment records.
- Around two-thirds of the shipment records did not list any species information.
- Where information was provided, the most frequently listed species were mango (24 percent of all shipments to the United States by value), acacia (9 percent), and pine (3 percent).
- Sheesham accounted for roughly 2 percent and teak accounted for 1 percent of India's other wooden furniture exports to the United States in 2019.
- 2 shipments listed ebony and one shipment listed merbau.

b**) Other articles of wood (HS 4421):**

- 36 species were listed in the shipment records.
- Around two-thirds of the shipment records did not list any species information. Where information was provided, the most frequently listed species were mango (26 percent of all shipments to the United States by value), acacia (3 percent), as well as pine and sheesham (each roughly accounting for 1 percent of all shipments by value).

- Teak accounted for roughly 0.5 percent of India's exports of other articles of wood to the United States in 2019.
- Other species referenced in the detailed shipment record data include ebony (0.1 percent of shipments by value), mahogany (0.02 percent), and sandalwood (0.01 percent).

A full breakdown of species found in India's exports of HS codes 940630 and 4421 to the United States is provided in Annex I.

Shipments to EU+EFTA countries

Forest Trends analyzed the detailed shipment records of all 155,623 shipments of "other wooden furniture" (HS code 940360) and 47,626 shipments of "other articles of wood" (HS code 4421) to the EU and EFTA countries in 2019. While other wooden furniture is within the product scope of the EUTR, HS code 4421 is currently outside the scope, and imports of HS 4421 are therefore exempt from the requirements of the EUTR.

a**) Other wooden furniture (HS 940360):**

- 24 species were referenced in the shipment records.
- Roughly 64 percent of shipments did not reference any species information. Where information was provided, the most frequently listed species were mango (19 percent of all shipments to the EU+EFTA by value), acacia (12 percent), sheesham (7 percent).
- Oak, pine and teak each roughly accounted for 1 percent of shipments by value.
- 2 shipments listed mahogany, 2 shipments listed marbau/vengai, and 2 shipments listed "African timber". All were exported to the United Kingdom

b)Other articles of wood (HS 4421):

- 38 species were referenced in the shipment records.
- More than 70 percent of shipment records did not include any species information. Where species were listed in the product descriptions, the most frequently cited species were mango (23 percent of all shipments by value), acacia (3 percent), as well as teak and sheesham both accounting for roughly 1 percent of India's other articles of wood exports in 2019.
- Other species referenced in the detailed shipment record data include ebony (0.03 percent of shipments by value), mahogany (0.1 percent), and meranti (0.01 percent).

A full breakdown of species found in India's exports of HS codes 960430 and 4421 to EU+EFTA countries is provided in Annex I

Shipments to Australia

Forest Trends analyzed the detailed shipment records of all 12,257 shipments of HS code 940360 and all 8,869 shipments of HS code 4421 exported to Australia in 2019. Other wooden furniture is within the product scope of ILPA, but HS code 4421 is currently outside the scope and imports of HS code 4421 are therefore exempt from the requirements of the Australian ILPA

a) Other wooden furniture (HS 940360):

- 12 species were referenced in the shipment records.
- Roughly 64 percent of shipments did not reference any species information. Where information was provided, the most frequently listed species were mango (24 percent of all shipments to Australia by value), acacia (10 percent), sheesham (5 percent).
- Pine and teak each roughly accounted for 1 percent of shipments by value.
- 1 shipment listed ebony

b) Other articles of wood (HS 4421):

- 18 species were referenced in the shipment records.
- Roughly 63 percent of manifests did not include any species information. Where species were listed in the product descriptions, the most frequently cited species were acacia (18 percent of all shipments by value), mango (17 percent), as well sheesham (3 percent of exports by value), and teak (accounting for roughly 1 percent of India's other articles of wood exports in 2019).

A full breakdown of species found in India's exports of HS codes 940630 and 4421 to Australia is provided in Annex I.

Shipments to Japan

Forest Trends analyzed the detailed shipment records of all 1,397 shipments of HS code 940360 and all 1,407 shipments of HS code 4421 exported to Japan in 2019. The Japanese Clean Wood Act covers a broad range of products including wooden furniture but "other articles of wood" under HS code 4421 appears to be outside the scope of the Clean Wood Act.

a) Other wooden furniture (HS 940360):

- 5 species were referenced in the shipment records.
- Roughly 60 percent of shipments did not reference any species information. Where information was provided, the most frequently listed species were teak (19 percent of all shipments to Japan by value), acacia (12 percent), mango (6 percent), and sheesham (5 percent).

b) Other articles of wood (HS 4421):

- 13 species were referenced in the shipment records.
- More than 80 percent of manifests did not include any species information. Where species were listed in the product descriptions, the most frequently cited species were mango (11 percent of all shipments by value), sheesham (3 percent), as well as sandalwood (2 percent of shipments by value). - Beech and acacia each accounted for roughly 1 percent of India's other articles of wood exports in 2019).

A full breakdown of species found in India's exports of HS codes 940630 and 4421 to Japan is provided in Annex I.

Shipments to the Republic of Korea

Forest Trends analyzed the detailed shipment records of all 822 shipments of HS code 940360 and all 497 shipments of HS code 4421 exported to the Republic of Korea in 2019. The Korean Revised Act on the Sustainable Use of Timbers only covers seven HS codes and does not apply to either wood furniture or other articles of wood.

a) Other wooden furniture (HS 940360):

- 7 species were referenced in the shipment records.
- Roughly 64 percent of shipments did not reference any species information. Where species were listed in the product descriptions, the most frequently cited species were mango (27 percent of all shipments to the Republic of Korea by value), teak (6 percent), acacia (2 percent), pine (2 percent), and neem (1 percent)

b) Other articles of wood (HS 4421):

- 7 species were referenced in the shipment records.
- Roughly three-quarters of manifests did not include any species information. Where species were listed in the product descriptions, the most frequently cited species was mango (15 percent of all shipments by value), kadam (Neolamarckia cadamba) (6 percent), as well as teak and acacia which each accounted for roughly 1 percent of India's other articles of wood exports in 2019. A full breakdown of species found in India's exports of HS codes 940630 and 4421 to the Republic of Korea is provided in Annex I.

Despite the high proportion of shipments of "other wooden furniture" (HS 940360) and "other articles of wood" (HS 4421) that did not list a species, interviews conducted for this report suggest that exporters, particularly those supplying the U.S. and European markets, are predominantly using mango, acacia, and to a lesser extent, sheesham. This suggests that the findings presented are indicative of the current species mix used in India's furniture and handicraft exports to regulated markets such as the United States and the EU+EFTA.

Emerging evidence that exports to regulated markets include high risk imported timber

This study confirms that a number of Indian companies supplying regulated markets are also importing raw materials from high risk source countries. However, the study cannot confirm from where the specific timber used in furniture and handicrafts exported under HS codes 4421 and 940360 was sourced. Some examples uncovered in this study include:

-Teak: At least one company supplying hand-crafted teak doors to the United States had sourced teak from Myanmar in the period between 2016 and 2019. Several companies supplying the United States, EU+EFTA, and Australia had also imported teak from Ghana, Nigeria, Costa Rica, Ecuador, and Tanzania
-Ebony: At least one company supplying 18 shipments of ebony wood products under HS code 4421 to Germany was also found to be sourcing ebony logs listed as Diospyros crassiflora from Nigeria in the period between 2016 and 2019. Nigeria reportedly bans the export of logs.
- Keruing: Several companies sourcing keruing from Myanmar were found to be supplying furniture and handicraft products to regulated markets in 2019 without any species information provided in the manifests. This included shipments to both the Netherlands and Australia.
- Mahogany: At least one company supplying regulated markets in the United States, EU+EFTA, and Australia had sourced mahogany veneer products from China in the period between 2016 and 2019

6. Summary Findings

The aim of this report is to outline India's growing prominence in the global wooden furniture and handicrafts sector, and to present a desk-based assessment of the main risks identified through an analysis of exports of "other wooden furniture" and "other articles of wood" (HS codes 940360 and 4421), with a particular focus on "regulated markets" such as the United States and the European Union, but also Australia, Japan, and the Republic of Korea.

As a result of increasing international and domestic demand, India is becoming a furniture-manufacturing hub, with timber product exports worth more than $1 billion in 2019, an increase of 138 percent by value since 2010. Demand is expected to increase exponentially in the next decade as India becomes one of the most competitive furniture- and handicraft-manufacturing centers in the region.

The Government of India has also taken steps towards potentially banning furniture imports in 2020, which, if implemented, will further increase domestic demand for Indian-made furniture. The government has sought to increase domestic productivity, particularly of trees in areas outside the designated forest area, such as agro forestry plantations and social forestry programs. Yet, overall production remains low, especially for the tree species preferred by India's furniture and handicrafts sectors. India has one of the highest rates of demand for fuel wood in the world, accounting for almost 90 percent of all domestic forest product consumption (FAO 2007; Shrivastava and Saxena 2017; Sood 2019). While poverty reduction strategies are reducing dependence on fuel wood, the Government of India reported just a 5.46 percent reduction in the overall demand for fuel wood in the past decade (MoEF 2019). This means that the majority of domestically produced timber is still used for fuel.

Demand for all forestry products (primarily timber and fuel wood) surpassed the domestic supply capacity in the mid-1990s. The gap between consumption and supply of timber was conservatively estimated at about 25 million m3 in 2006 and is likely to have grown significantly since (FAO 2007). The gap for high-value hardwood species is likely to be significantly larger.

India has relied increasingly on imports to fill this supply gap. Imports have almost doubled in the past decade. To date, imports have been estimated to account for roughly 25 percent of India's total available supply of timber and bamboo (excluding fuel wood), but this proportion is likely to rise in the next decade. Reports suggest that India's timber imports will increase from an annual volume of 18.01 million m3 (based on 2015 data) to 22.51 million m3 by 2020; 27.91 million m3 by 2025; and 31.5 million m3 by 2030 (Shrivastava and Saxena 2017). Recent economic concerns resulting from the COVID-19 pandemic have led the Indian government to consider other incentives to boost the domestic furniture industry further, including proposing to offer duty-free imports of raw materials (The Economic Times 2020). Many of the countries supplying India with raw materials suffer from poor governance in their forest sectors, with the risk of corruption, illegal harvesting and document fraud considered to be high. The International Union of Forest Research Organizations estimates that India was the third-largest importer of illegally logged timber in the world in 2016, after China and Vietnam (Kleinschmit et al. 2016). India has not taken steps to develop a regulation specifically designed to exclude the import of wood products harvested and traded in violation of the laws and regulations in the source country. However, India has put in place a number of measures that regulate taxes (e.g., customs duties or royalties), sanitary and phytosanitary conditions, (e.gplant health), restricted and prohibited products (e.g., logs and debarked wood trade bans), as well as endangered species (e.g. CITES).

Without specific measures to ensure that India's imported raw materials are legally sourced, there is no guarantee that India's exports of manufactured timber products (furniture and other articles of wood) are verified as legal.

At the same time, more than three-quarters of India's timber products are exported to countries that now have laws in place to restrict the import of illegal wood and forest products. For furniture, this percentage rises to 90 percent. Importers those are non-compliant with those laws risk enforcement actions including fines, penalties, and prosecution, while Indian suppliers risk losing out to other countries that can provide the legal assurances requested. This includes the United States and the EU, but also in Australia, Indonesia, Japan, and the Republic of Korea, and will soon include Vietnam and Thailand.

Buyers in these markets, as well as Indian exporters looking to maintain market access are therefore exposed to the risks associated with India's imported timber products.

Genetic Variation in Teak Forests and Considerations for Tree Improvement:-

1. Provenance variation for economically and ecologically important traits has been investigated over the last 60 years and was found to be huge, but far from fully explored. Part of the genetic diversity that has been lost in natural forests may still be found in planted teak forests, many of which originate from the early introductions of
the species around the world. It is therefore of fundamental importance to further investigate and characterise teak genetic variation in planted and natural populations for breeding and mass propagation. Selection and testing of planting material continues to be highly relevant as an integral part of any major planting program. Strategic
plans at international, national and program level on the development and use of genetic resources ('genetic business plans') are important, whether in public-private partnerships, forestry investment schemes, or to the benefits of smallholder growers. The primary objective of such a plan should be to facilitate access to good quality planting material of well documented and reliable origin.

Strengthen International Collaboration and Regional Networks on Forest Genetic Resources:-

International collaboration and regional networks on forest genetic resources (e.g. TEAKNET, APFORGEN, SAFORGEN, LAFORGEN) should be strengthened to develop action plans for the conservation and management of teak genetic resources. Such action plans might include:

- development of geographic, operational, and reliable genetic resource databases for characterizing every teak origin and seed production stand with location maps and common descriptors.
- development of appropriate quality standards and accreditation schemes for teak planting material involving the germ plasma production and delivery sector, and current schemes for control of reproductive material (e.g. the OECD scheme on forest reproductive material);
- development of user-friendly decision support tools to guide the choice of planting material for specific sites (recommendation domains), in conjunction with market information services;
- measures to ensure that these standards and tools aremainstreamed with policy makers, extension servicesand the private sector, including manuals, policy briefs

and other capacity building and extension material;

- development of indicators that are suitable to monitor the performance of delivery pathways with regard to standards including the performance and viability of plantings;

Improve the Management of Natural Teak Forests towardsSustainability:-

- Strengthen forest governance and law enforcement by increasing transparency, by cooperating with local communities including other relevant stakeholders, and by mobilising funds for integrated land use planning, forest conservation, rehabilitation and restoration
- Review and improve the existing silvicultural systems and practises, such as applying a flexible schedule of silvicultural operations in individual stand management; in addition, secure in-situ conservation stands of natural teak forests on a wide range of site conditions (e.g. climate, soil, elevation) and complement these conservation measures through the establishment of seed orchards and gene banks
- Establish and implement performance and results-based compensation schemes (e.g. PES, REDD+) that are specifically designed to conserve and sustainably manage natural teak forests
- Include social aspects into forest management, addressing tenure and user rights of forest communities, cost and-benefit sharing arrangements as well as the empowerment of women, indigenous groups and minorities.

Support High-Quality Timber Production in Planted Forests:-

- Review and adapt government regulations and codesof-practise to facilitate site and stand-adapted silviculturalmanagement

- Support the publication of teak growers' manuals in the respective local language, designed particularly for different target groups.
- Promote capacity building and awareness campaigns for various kinds of teak growers including smallholders and for operators.

Support Small-Scale Teak Production Systems for Smallholder Farmers:-

- National governments should encourage and support small holders to plant teak through incentive programs, marketing support, formation of cooperatives, access to land titles or long-lease land tenure
- Facilitate access to affordable sources of quality planting material for farmers
- Support the formation of farmer-industry partnerships, support group marketing schemes, simplify timber trade regulations and eliminate extra-legal fees to enhance market access while reducing transaction costs
- Regularly publish market information on teak prices and quality
- Provide silvicultural and agro-forestry management training through extension services for enhancing smallholders' technical knowledge and capacity.

Improve the International Marketability of Teak:-

An international forestry or timber trade organisation should take the mandate to develop and adopt an agreed set of log grading rules in collaboration with global buyers to reduce market constraints and to improve the marketability of teak wood products taking into consideration the quality and dimensions of logs from plantations as well as from natural forests. By the same token, public and private teak producers and processors are encouraged to pursue voluntary certification schemes (management and chain-of-custody certification) if they wish to meet environmental, social and economic standards of responsible forest management and gain better access to North American and European markets.

Provide Impartial and Unbiased Cost-Benefit Analyses for Potential Investors:-

To be profitable, teak plantations require stable and predictable market conditions as well as good forest management practices with the objective to increase yields and reduce costs through suitable operational measures. In order to support the application of such a management regime impartial and unbiased cost-benefit analyses on teak investments should be made available through publications, internet portals or information leaflets. TEAKNET could take a leading role in publishing such information on-line on its website.

Improve Statistical Information on Teak Round wood Production and Trade:-

A formalized exchange of information on the production and trade of teak would be of mutual advantage to importing and exporting countries. In this context reliable information on the dimensions, quality, origin and price of teak round wood and major wood products in internationally acknowledged measuring units should be made available on a regular basis.

Natural Teak Forests:-

Teak naturally occurs in four South and Southeast Asian countries, namely Myanmar, India, Lao PDR and Thailand (Figure 1). In 2010, the total area of natural teak forest in the aforementioned countries was estimated at about 29 million hectares and almost half of the total teak forest areas can be found in Myanmar (Kollert and Cherubini 2012). These four countries have practiced similar silvicultural systems on natural teak forests, depending on the forest types and site conditions. The earliest system of managing natural teak forests in these countries was the selection system: a given forest area was worked under predetermined felling cycle, minimum girth, and remaining mother trees as seed bearers to ensure natural regeneration of teak forests. The selection system aims at harvesting mature and over-mature trees across the entire forest area by preventing formation of large canopy openings in the long-term view. Theoretically, the system retains continuous forest cover while assuring soil fertility, maintains the unique floristic composition and uneven-aged structure of forest stands, and encourages resistance against pest and diseases (Bebarta, 2002). However, the area and growing stock of natural teak forests in their natural habitat have been gradually decreased for degradation is accelerated by over-exploitation for local uses (Tewari, 1992) and livestock grazing. In the case of Laos the teak forest area and growing stocks decreased due to population pressure, shifting cultivation, and forest fires (Anonymous 1998). The natural teak forests in Thailand decreased with economic growth, agricultural expansion, encroachment, illegal

logging, shifting cultivation, and fires, etc (Sumantakul and Sangkul 1998; FAO and RECOFTC 2016).Nowadays, an assessment of the silvicultural system several reasons. In Myanmar it is obvious that the teak forests are declining due to logging (legal and illegal), agricultural expansion, shifting cultivation, and mining, etc., with an annual deforestation rate of 0.9% (FAO

and RECOFTC, 2016). In India, natural teak forestis applied in natural teak forests; whether the system has been perfectly and sufficiently applied in the prescribed silvicultural operations, is crucial for improving the system and an evaluation of the performance of the system by investigating the regeneration status of desirable species in the logged forests.

India:-

India is the largest country in South Asia with more than0% of the total landmass of the region and is located betweenlatitudes 8° N and 37° N and longitudes 68° 7' E and97° 2' E. The elevation varies, ranging from an average elevationof 6000 meters above sea level in the mountainousregion to 30 meters above sea level in the coastal areas. Indiahas diversified climatic conditions, ranging from tropicalwet to semi-arid and arid (Pant and Kumar, 1997, Ghassemiand White, 2007). The average annual temperature isvarying from the Himalayas to the arid and semi-arid areas,with a temperature range of 5 °C to 40 °C in the hottestmonth and of 0 °C to 30 °C in the coldest month (Hussain,2008). The humid North-East (North-Eastern India, Sikkimand North-Western West Bengal) receives the highestannual rainfall, i.e. 200 cm, and the arid region receives thelowest annual rainfall of less than 25 cm.India is the second largest populous nation in theworld, with about 1.25 billion people in 2011 (Visaria and Ved 2016). There are 14 forest types in India, of whichthe subtropical dry deciduous, tropical moist deciduous,tropical thorn and tropical wet evergreen forests are important(Rawat and Ginwal 2009). Teak naturally growsin regions below 24° N latitude and natural teak forests covered about 6,810,000 hectare in 2010. Apart fromKerala, Tamil Nadu and parts of Maharashtra where artificialregeneration is applied, natural regeneration is themain tending practice in most parts of natural teak growingareas. Other silvicultural systems such as the coppicesystem, clear felling with conversion to uniform system,and the selection system with improvement felling arealso applied in natural teak forests (Kumaravelu, 1991).Although the Indian forests were managed as an openaccess resource until the end of 1800, the Forest Act enactedin 1865 encouraged the state acquisition of forests(Haeuber, 1993). The earliest attempts to manage thenatural forests of teak in India consisted of securing asustainable supply of timber. In 1880, the rulers of Indiapaid special attention to teak forests for providing quality wood for the navy and ship-building industry (Negi,1994). In 1980, India imposed a timber export ban onlogs and lumber (Bourke, 1988)

Concluding Remarks:-

The following issues are critical for the success of teak plantations to produce solid timber quality:

- good site selection, use of genetically improved plant material,and adequate soil preparations are of utmost importance;
- careful planning of standing stock management, including initial spacing, thinning prescriptions, and harvest age based on biological and financial considerations to obtain the desired products in the shortest time possible;
- Timely execution of several operations. For example, consideration of planting time, pruning, and thinning operations;
- an early first thinning (3-to 8-year-old) depending on the desired products, site quality, and genetic material. This is necessary even if there is no market for the products, as it is essential to avoid an early decrease in tree diameter to obtain the largest stem size within the shortest possible time. Growers should not be afraid of doing intense thinning, especially at early stages. The investment made in cutting trees with little or no value will be largely compensated by the value obtained at the final crop.

- pruning to get knot-free high quality timber for the international markets
- assessment of nutrient needs of teak along the rotation. Standardise protocols to evaluate fertilisation responses and scale them to operational level
- management of pest and diseases has to be taken seriously by growers to avoid losses in productivity. Further work on quantifying potential economic damage and on genetic improvement will be necessary to obtain pest resistant plants;
- it is of utmost importance to have a good monitoring plan which helps not only to know the dynamics of growth and yield but to follow the correct and timely application of silvicultural operations to meet the desired management goals. The establishment of permanent plot networks and measuring additional variables is needed to get more precise information in order to be able to predict growth and yield, and especially on

quality issues such as stem form and defects that may affect merchantable volumes

The following trends are observed:

- Timber from fast growing plantation appears to have physical/mechanical properties as good as of those of timber from old-growth plantations. However, perception and decorative issues can be a barrier to penetrate the market of natural forests teak. Thus, although it is unlikely that teak from fast-grown, short rotation plantations reach the average prices of old-growth teak, its market will continue to expand in the near future;
- private companies and small producers in Latin America favour the use of wider spacing, earlier and more intense thinning, and shorter rotation ages (15-20 years), owed to the prevailing high interest rates for plantation projects, as well as the need of income from the final harvest as early as possible. Improved material and adequate silvicultural practices are mandatory for such purposes
- sustainability and environmental services (e.g., carbon sequestration) are an increasing concern in forest plantation management. The use of the best silvicultural practices in every stage to reach sustainability goals can help to guarantee sustainability

- adoption of modern concepts and techniques of intensive and sustainable forest management (e.g., precision forestry, nutrient dynamics, and informatics including advanced remote sensing techniques, optimization, and simulation models).

The following are tentative policies that global and national institutions could adopt or reinforce:

- Develop mechanisms to make planting teak an activity that is attractive both for tree growers and for investors;
- promote the exchange of information on the establishment and management of teak plantations around the world
- develop globally uniform grading teak rules for timber from plantations. Standardise and divulgate conversion factors to estimate and predict future commercial yield of specific products from standing volume estimations.
- favour initiatives and search for funding to propose and executeinternational projects for studying the performanceof improved genetic material under a wide set of site conditions;
- to reduce negative perception by people in relation to teak plantations;
- work to reduce negative perception by people in relation to teak plantations
- inform and facilitate the access to improved genetic material, especially for small holders
- evaluate the impact of regulations in the process of establishment, management, and commercialisation of teak plantations;
- devise policies to allow the growers obtain added value for their products or further benefits in the value chain
- develop mechanisms of participation and benefits from teak plantations of stakeholders such as communities and workers;
- favour the creation or reinforcement of institutions for providing small producers with technical support for establishment and management of teak plantations.
- stimulate the incorporation of teak plantations under sustainable management schemes; analyse impacts of certification issues in enhancing sustainability of teak forest plantations;

Wood Quality for Advanced Uses of Teak from Natural and Planted Forests:-

Teak is preferred for its high quality timber owing to its moderate density and strength, high dimensional stability, high durability and ornamental wood figure. The key wood characteristics are linked to the heartwood formation. Considering the declining supply from natural forests,

the long-term prospects of short rotation plantation grown teak seem promising, and the following factors are considered relevant in terms of end-use.

- The wood properties such as colour, grain, texture, wood density etc. of teak from young plantations are slightly different and fetch lower prices in the market than the naturally grown teak or plantations of 50-60 years.
- Enough evidence is available from different parts ofthe world to show that plantation-grown small dimensionteak is not inferior to natural teak of the same agein terms of density, strength and shrinkage
- After log geometry and knottiness considerations, profitability is substantially influenced by the proportion of sapwood
- The colour of heartwood is an important wood characteristic for commercial products and can be controlled by a suitable genetic selection
- Heartwood percentage increased with growth rate of trees with increasing DBH and the effect of growth rate on the heartwood-sapwood ratio seemed to decline with age. Consequently, it is possible to produce large diameter logs with greater proportion of durable heartwood per tree by accelerating tree growth through silvicultural interventions in short rotation plantations.
- Higher natural durability and stability of teakwood is reflected in higher extractive content. Fast-grown teak is generally less durable than mature teak due to a lower amount of extractives.

  By adopting simple colorimetric methods and extractive content assessment (e.g. through NIRS), durability can be assessed for plantation teak at young age.
- In order to obtain highly durable teakwood for special products and for external applications, it is advisable to retain the teak trees for longer rotations of 50-60
- years or more, disregarding short-term investments and benefits. Genetic improvement may overcome the need for long rotation since the variability in extractive content could be controlled through judicious selection strategies.
- A combination of appropriate site selection coupled with good germplasm material and by adopting the right silvicultural practices could increase the yield to 8-10 m3/ha/yr that will be realistic on a short rotation of 20 years for better economic returns.
- Teak exhibits wide variations in wood quality traits and within-tree variations are greater, rather than between populations; this characteristic of within tree variations has to be taken into consideration for tree improvement.
- Existing grading systems for teak timber need to be reviewed and changed as necessary, taking into consideration the quality and dimensions obtainable from plantations as well as from natural forests
- Standardised internationally accepted log grading rules and volume measurements should be followed for the trading and marketing of teakwood.
- Matching the provenances for specific site conditions (site matching) and product requirements appears to be most crucial in tree improvement programmes
- National and international agencies should strive to promote best practice in teak cultivation and management, especially to ensure the ability of small scale growers to manage wood lots sustainably, to access markets and to make profitable returns for their livelihoods

Report findings:

1. **Furniture and handicraft manufacturers are primarily using timber species that are grown and harvested in India in their export-oriented products** (2019 data)

- Desk-based research and interviews conducted for this report suggest that only larger manufacturers are using imported timber in their products, compared to the millions of SMEs and artisans who use less. Products manufactured from high-value or protected species—typically tropical hardwoods—can be sold for double the price on the international market compared to the domestic market. Rising scarcity of these tropical hardwoods will increase their market value, increasing the incentives for illegal logging and associated trade.

-In Forest Trends review of detailed shipment records covering India's exports of HS code 940360 and 4421 to the United States and EU+EFTA (European Free Trade Association) countries, Australia, and the Republic of Korea**, mango and acacia were most commonly referenced**. Mango and acacia are likely to be low risk and grown in Indian plantations. India imported low volumes of mango and acacia between 2016 and 2019. All imported mango was sourced from China while 80 percent of imported acacia was sourced from Vietnam, 12 percent from Malaysia and 8 percent from low risk source countries. While more than 60 percent of these shipment records listed no species information at all, this finding is

supported by interviews conducted for this report that suggest exporters, particularly those supplying the U.S. and European markets, are predominantly using mango, acacia, and to a lesser extent, sheesham. **This suggests that the findings presented are indicative of the current species mix used in India's furniture and handicraft exports to regulated markets**

2.While teak is reportedly widely used in Indian furniture production, Forest Trends found that only 1 percent of India's exports specifically listed teak in shipment record data.

Teak remains a major species used in furniture manufacturing in India, estimated to be used in as much as half of all wooden furniture produced in India. However, just 0.7 percent of the furniture exported to the United States and 0.5 percent exported to EU+EFTA countries under HS code 940360 (1 percent to all global markets), referenced teak.

Forest Trends found teak to be the most common species listed in exports to Japan (19 percent by value). Given the high proportion of shipments that did not specify a species, it is possible that additional shipments could contain teak. However, it is also possible that a higher proportion of teak furniture remains in the Indian domestic market where it is a popular material, particularly in western and southern regions of India (EPCH 2017).

3. **Decreasing domestic productivity for certain species such as teak, and rising imports over the past decade suggest that imported timber is likely to be more widely used in furniture and handicraft production in the future**

This is despite the fact that many exports listed domestic, Indian-grown and -harvested species. Forest Trends also found that a number of Indian companies supplying regulated markets also imported raw materials from high risk source countries between 2016 and 2019. However, this study cannot confirm the source of the specific timber used in furniture and handicrafts exported under HS codes 4421 and 940360.

4. **There are considerable risks associated with India's imported timber**

This report finds that 42 percent of India's timber imports in 2019, including 44 percent of logs, 42 percent of sawn wood and more than 75 percent of veneer imports, were sourced from countries assessed as being at high risk for illegal logging based on governance, corruption and harvest indicators or from fragile and conflict-affected states as categorized by the World Bank. More research is required to determine the extent to which veneer is used in Indian-manufactured furniture. While fewer than 40 species were listed in India's exports to regulated markets, Forest Trends found that India imported more than 250 species of logs, sawn wood, and veneer between 2016 and 2019.26 From this, 171 species, (38 percent of India's log, sawn wood, and veneer imports by value) were species assessed as being Near Threatened, Vulnerable, Endangered, or Critically Endangered on the IUCN Red List. As much as 64 percent of India's veneer imports in the time period contained species assessed as Vulnerable on the IUCN Red List, suggesting that veneer imports are considered to be particularly high risk.

5. **There are traceability and legality verification risks associated with Indian-manufactured furniture and handicraft products**

While there are a number of certification systems designed to verify forest management in India, FSC or PEFC are the main schemes that are certifying forest management in India. There are also several CoC systems in operation but only a few furniture factories or artisans use them. FSC and PEFC are the main international standards offered while an Indian system known as VRIKSH has been designed to help companies, particularly SMEs and artisans, to trace their product from the forest all the way to individual consignments through a series of checks. These standards have varying levels of robustness and scope. A 2019 assessment of VRIKSH said that it was "unable to determine whether anyone can actually verify that the wood in a particular shipment actually CAME from where the paperwork says it comes from" (CITES 2019). As with all other document-based certification schemes, there is a risk that the timber product presented for export is not the species of wood presented in the certificate.

This is why the U.S. and EU+EFTA governments do not recognize privately certified timber as automatically complying with the U.S. Lacey Act or the EUTR. Overall, the number of Indian exporters claiming to be certified remains low.

6. **Verification of imported timber legality is a major weakness, even for certified products**

s (Poynton 2013). PEFC and FSC have been widely criticized in the past for poor standards on imported timber (EIA2017), and while the VRIKSH legality assessment and verification standard includes provisions to ensure timber has been legally imported, importers are only required to make documents available detailing the source country and species, the value of the timber and a phytosanitary certificate in addition to other regulatory documents which are not further detailed. This exposes importers in regulated markets to significant risks associated with India's imported timber both now and in the future, as imports grow to meet increasing domestic and international demand

7**. India's timber product exports are therefore vulnerable in regulated markets**.

With such a large volume of wooden products exported to markets that either have timber import regulations in place, or are currently designing/operational zing regulations to exclude timber that

cannot be verified as legal, many furniture and handicraft artisans are likely to face increasing demands that the timber they use is verified as legal. Enforcement checks and prosecutions against companies have been pursued in recent years in some of India's main markets. For example, Lombok, a UK-furniture company, was prosecuted and fined in 2017 for importing furniture manufactured in India that was in breach of the EUTR (UK BEIS 2018). As imported materials are expected to become more widely used, India faces even greater vulnerability in the coming years.

e. **Composite wood products, and finished goods containing composite wood products, including furniture and handicrafts, should in general be considered as high risk**

This includes products made from MDF, high-density fibreboard (HDF), oriented strand board (OSB), particle board, paper, paperboard, and cardboard. This study confirms that these products are manufactured in a manner that makes it difficult and perhaps expensive to identify the genus, species and country of harvest of the wood content. Plywood and products made from plies of wood are easier to identify species and origin than composite products, which are mechanically processed into small fibers and bonded together chemically

7. Higher risk species found in India's exports to "regulated markets" in 2019:
The following species should be considered potentially high risk if declared in Indian-manufactured furniture and handicraft products. The basis for this list is Forest Trends' assessment of shipment record data to identify the species in India's 2019 exports of "other wooden furniture" (HS 940360) and "other articles of wood" (HS 4421), as well as data on India's supply (both domestic production and the source countries/risks associated with India's imports between 2016 and 2019)

a) Teak:
While India has a significant area of plantation teak, the volume and quality of teak available is not currently sufficient to meet demand. This has led to increasing imports from countries associated with significant risks of illegal logging, particularly Myanmar, and those at risk of illegal exports, particularly Ecuador and Benin. More than 80 percent of India's teak imports over the past three years have been sourced from high risk source countries based on governance and harvest risk, or from conflict states as designated by the World Bank

b)"Sheesham", "Dalbergia Sissoo", "Rosewood", "Indian Rosewood", "East Indian Rosewood", "Dalbergia Latifolia":
These terms appear to be used interchangeably in the detailed shipment record data. These species are only permitted to be harvested within India from agro forestry plantations. Management of the species is reported to vary across the regions in India, but in general, harvest from the wild does not occur often (CITES 2019)

- Dalbergia sissoo is a restricted or reserved tree in Jharkhand, West Bengal and Assam, where harvest from the wild either requires special permission, or is completely banned (TRAFFIC India n.d.).
- Bihar has banned harvest due to rapid deforestation and reduced availability of plantations.
- Both Dalbergia species, if used in furniture and handicraft production, are likely to be sourced from Indian agro forestry plantations but both species are listed in CITES Appendix II, despite India requesting their removal from the listings in 2019. This request was rejected and therefore shipments containing Dalbergia species should be accompanied by a CITES-comparable document unless exempt from CITES regulations.27 As the Export Promotion Council for Handicrafts (EPCH) has been designated as the competent authority to issue the comparable document in lieu of the CITES permit, imports should be accompanied by a VRIKSH Shipment Certificate.
- There are reports that Dalbergia species are sometimes referred to as "tali" in India. This should therefore not be confused with India's imports of Erythrophleum spp., often from high risk African countries, which are also commonly called "tali".

c) Mahogany (Khaya ivorensis):
: A very small number of shipments referenced mahogany furniture or handicraft exports in 2019. Mahogany (Swietenia spp.) reportedly grows in plantations in Kerala, Tamil Nadu, Karnataka, Andhra, and Bengal, and can be considered as low risk. India imported very low volumes of mahogany between 2016 and 2019 (including true mahogany, Swietenia spp.; all Neotropical species which are listed in CITES Appendix II; and African mahogany, Khaya spp.). Yet, 44 percent of imported mahogany was sourced from high risk countries or conflict states including Angola, Mozambique, Côte d'Ivoire, Ghana and DRC. The African imports are likely to be Khaya ivorensis, which is subject to high levels of exploitation and categorized as Vulnerable by the IUCN Red List

d) "**Merbau" or "Vengai":**
There was just one shipment of "vengai" to the United States in 2019 and three shipments to the EU+EFTA, but there is limited information on India's domestic production of merbau/ vangai. India imported significant volumes of merbau/kwila/ipil between 2016 and 2019, primarily from three source

countries: Papua New Guinea (69 percent), Indonesia (18 percent), and Malaysia (13 percent). There are reported risks of illegal logging in all three countries: a Chatham House study estimates that the majority of India's illegal timber is imported from Malaysia and Indonesia (Chatham House 2020). More than 80 percent of the wood-based trade from Papua New Guinea has been reported to derive from unlawful harvest (UNODC 2013). The IUCN Red List also reports the species as "Vulnerable" (IUCN 2020)

e) **Ebony:**

There were two shipments under HS code 940360 that listed ebony to the United States, and one to Australia in 2019. However, ebony was more common in exports of HS code 4421, with 145 shipments to the United States and EU+EFTA countries in 2019. Diospyros ebenum or Indian ebony grows in southern India but there are reports that India has banned the export of Diospyros ebenum. Indian companies imported low volumes of ebony (Diospyros spp.) between 2016 and 2019. One-quarter of imports were sourced from high risk countries or conflict states including South Sudan, DRC, Gabon, Cameroon, and Nigeria. Around 50 percent was sourced from China. The remaining 25 percent was sourced from low risk European countries, although Diospyros species do not grow in Europe, which means the timber was originally sourced elsewhere. This study found that at least one company supplying 18 shipments of ebony wood products under HS code 4421 to Germany was also found to be sourcing ebony logs listed as Diospyros crass flora from Nigeria in the period between 2016 and 2019. Nigeria reportedly bans the export of logs. Timber products under HS code 4421 are currently outside the scope of the EUTR

f) **Bintangor, brown terminalia, nyatoh, kempas and okume in Indian-exported furniture products should be considered as high risk as the wood has likely been sourced from conflict states** as designated by the World Bank. This includes sourcing from the Solomon Islands, Myanmar, Togo, Sudan, South Sudan, Papua New Guinea, Republic of Congo, Liberia, and DRC.

g) **Mora, purple heart, tali, pyinkado, padouk, okume, keruing, ceiba, santos rosewood, gmelina, and teak in Indian-exported furniture products should be considered as high risk as the wood has likely been sourced from countries considered as being at high risk for illegal logging and trade based on governance and harvest risk indicators**.28 These source countries include Suriname, Brazil, Ecuador, Ghana, Benin, Tanzania, Gabon, and Cameroon among others

h) **Teak, meranti, merbau, balau, kapur, keruing, nyatoh and padaouk should be considered as high risk as this wood was most likely to have been sourced from countries with active export restrictions in place**. These source countries include Malaysia, Ecuador, Ghana, Brazil, Papua New Guinea, Costa Rica, Colombia, and Panama among others.

i) **Red sanders/red sandalwood:** No red sandalwood was found reported in India's exports of HS code 940360 but there were reports of "sandalwood" jewellery in India's exports of 4421 to the United States and Japan in 2019. Though red sanders/red sandalwood is listed on the "prohibited" list of exports, some product categories are instead listed as "restricted", which means that their export is permitted in certain circumstances such as being harvested from cultivated land. Red sanders/red sandalwood is a very high value species that can be sold for double the price on the international market compared to the domestic market

j) **Oak and pine: In general, Indian-manufactured furniture made of oak and pine should be considered low risk unless the country of harvest is Ukraine, Russia or Romania where high rates of illegal logging and associated trade have been well documented.**

Concluding Recommendations

The report presents two main recommendations:

1. **For governments in countries with laws regulating the import of illegal wood:** This report finds that the majority of the potentially high risk species were listed in products exported under HS code 4421, which is outside the scope of many timber import regulations including the EU Timber Regulation, the Australian Illegal Logging Prohibition Act and the Japanese Clean Wood Act. In the case of the Republic of Korea, all wooden furniture products and HS codes as well as "other articles of wood" under HS code 4421, are currently outside the scope of products covered by the Korean Revised Act on the Sustainable Use of Timbers.

As such, we recommend that the European Commission and the governments of Australia, Japan and the Republic of Korea broaden the scope of the products covered by their regulations to include all wooden furniture HS codes and "other articles of wood' under HS code 4421. Any government in countries currently designing regulations seeking to eradicate illegally logged timber from their markets should ensure that these products fall within the scope.

2. **For the Government of India:** Given that India's timber product exports are already vulnerable in regulated markets, and many furniture and handicraft artisans are likely to see increasing demands to verify that the timber they use is legal, **we recommend that the Government of India develops a robust import regulation specifically designed to exclude the import of wood products that are harvested and traded in violation of the laws and regulations in the source country.**

FURTHER RESEARCH

This report presents a desk-based review of existing information on India's supply (production and imports), and demand (both international and domestic), as well as information on India's wooden furniture and handicraft industry. This study has been designed to summarize existing data and information as well as to identify research questions for a second, field study that will focus on furniture hubs supplying key regulated markets like the United States and the EU+EFTA. In light of the findings in this report, it is recommended that the in-country study focuses on four "hubs". These could include:

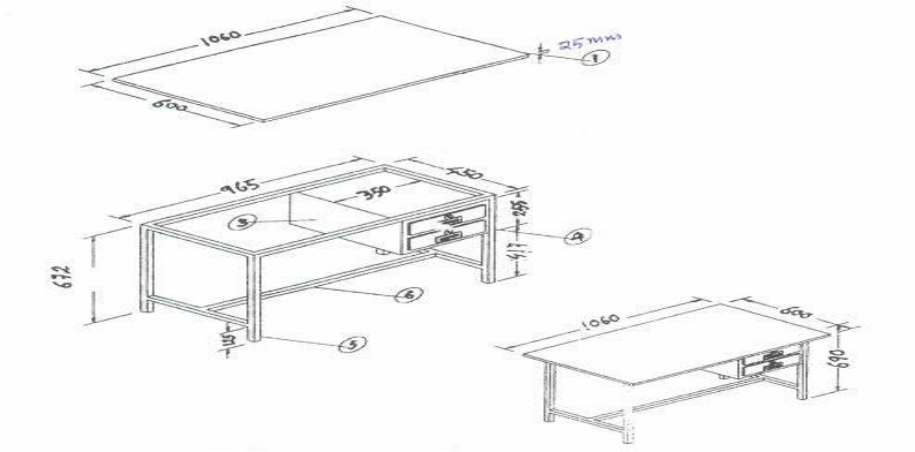
1. Jodhpur, in Rajasthan, which now has a strong presence in international wooden furniture markets. More than 50 percent of India's furniture exports to the United States and the EU+EFTA countries in 2019 came from Jodhpur.
2 Delhi (accounting for 18 percent of exports of furniture under HS code 940360 to the United States in 2019, although only 3 percent were to EU+EFTA countries). Delhi is also a hub for agents within India who are responsible for linking imported timber with producers and selling furniture to international buyers
3. Jaipur/Sikar (accounting for 12 percent of exports of furniture under HS code 940360 to the United States and 24 percent of exports to the EU+EFTA in 2019). Jaipur and Sikar in Rajasthan were key centers for production of other wooden furniture using sheesham (Dalbergia sisso) and accounted for 60 percent of India's exports of sheesham furniture under HS code 940360 to the United States in 2019. All the exports originating from Sikar reported sheesham as the main furniture component.
4. Mumbai or Bangalore, only accounting for 1 percent of India's 2019 exports of wooden furniture under HS code 940360 to the United States and 0.6 percent of exports to EU+EFTA countries, but were most likely to export teak furniture. Mumbai produced the most teak furniture exported to the United States in 2019, accounting for around one-third of all India's other wooden furniture exports to the United States that specified "teak". More than 60 percent of the furniture produced in Bangalore and exported to the United States included teak. The other 40 percent of exports did not include any species information.

Key questions for the in-country study include:

- What is the 2020 overall supply (domestic supply plus imports) and demand (domestic demand plus exports)?
- What is the forecast for domestic production in the next 10 years?
- What are the legality risks associated with timber harvested in India?
- How does this vary across the regions/states?
- What are the main overland trade routes, border points, quantities, and actors involved? Through interviews with traders in India, to what extent is the overland illegal timber trade between Myanmar and India a significant risk?
- Which manufacturing centers are using raw materials sourced from Myanmar and other high risk countries? What products are being produced? Who are the ultimate consumers of these products?

- What is the structure of the furniture industry, and how is this changing? Are SMEs still purchasing imported timber through agents in Delhi and other major centers?
- What are the preferences for Indian consumers?
- How often is teak being used in furniture production? How often is teak furniture exported to the United States and to Europe?
- What proportion of exported furniture and handicraft products are using reclaimed wood? Where and how is reclaimed wood produced?
- What are the Government and/or industry attitudes and plans for introducing robust import restrictions designed to exclude the import of wood products that are being harvested and traded in violation of the laws and regulations in the source country?

OFFICE TABLE
SPN .NO:- SF19E0006
OVEERALL SIZE: (L) 1060 X (W) 600 (H) 690 mm.



MATERIAL DETAILS:-

12. TABLE TOP: - 25mm THK. ISI Marked Pre Laminated MDF Board IS-14587-1998. with upto date amendment
2. LIPPING: - Teak wood half round 25mm wide.
3. DRAWER BOX: - CR sheet 0.80mm thick Confirming to IS-513 size CUBOARD 450(D) x350(W) x255mm (H).
4 DRAWER SIZE: - 400(L) X80mm (D) Minimum.
5. FRAME &:- ERW Square pipe 25x25x1.25mm in size STRUCTRUE 965(L) x450(W) x670(H) mm
6. FOOT REST: - ERW square pipe 25x25x1.25mm in full length.
7. Also refer "General Requirements."

Wood processing in the surveyed areas

Gunungkidul

Twenty five industries were visited and surveyed during the study. It is noted that the majority of industries found in Gunung Kidul had sawmill. Mostly they employed air drying technique to dry the wood. Some of them used heater, but no kiln dryer found in the district (Table 21). From 25 processors surveyed, there were 19 companies who broke down teak logs into sawn wood by themselves. The remaining 6 companies might ask for help to other companies or the third parties to break down their logs. It was found 11 companies who dried their sawn wood using the oldest technique of wood drying, namely air drying. Some companies (5 industries) have been studying how to improve the drying technique by heating the wood with hot air circulated in a chamber. The heat was obtained from burning the wood waste in the mill. The other form of heating is warm water to be circulated around the wood chamber. Table 18 shows that among 25 industries, more than half worked for furniture production

The need for wood processing improvement

The current teak wood processing observed in the small sized industries is mostly considered traditional, less efficient and using simple and often traditional tools for wood processing. There are a wide range of opportunities to improve the current wood processing to achieve the high quality of teak wood products. The following areas in wood processing are suggested:

1. The sawing technique.- The technique employed should consider the log quality and the price of sawn timber. This combination factor will generate high revenue of sawmilling. The current sawing technique is mainly tangential lumber type sawing. This sawing method does not consider the log quality or log defects along the stem. Consequently, the lumber quality and its yield are not predictable.
2. Sawing machine. - The proper use of sawing machine and type of saw blade should be employed in the sawing system. By doing so the recovery rate can be increased significantly and the waste percentage can be minimized.

3. Drying technique.- The proper drying technique should be introduced to the community wood industry. The setting up location of air drying with wood piling above the ground and covered by roof would minimize the effect of high humidity of soil and high humidity of air during night. Since wood is hygroscopic material, then it could attract moisture from the air and soil easily. The current air drying conducted by rural people or community wood processors is merely vertical arrangements of teak lumbers in rows in an open area without roof or only laying the lumbers in a declining position. The base lumber directly touches the soil. This technique of wood drying produces wide variabilities in the moisture content of wood and longer time to reach a certain moisture content. A relatively modern wood drying such as heating the wood piling to a certain temperature is an effort to reduce the drying time and smaller variations of the moisture content. This system seems to do well and requires small investment to build, but the drying defect is relatively high. Hot water drying system needs a bit high capital to set up the machine, however it will produce uniform moisture content and lesser drying defects.
4. The improvement of color appearance of sapwood.- The light color of teak sapwood, which is whiter than the heartwood should be reduced as much as possible for increasing the teak wood value. One of the known methods to make this sapwood portion do not appear is to change its color to the similar color of heartwood. This could be done by heating the wood. The heat treatment has shown a good promise to reduce the heterogeneity of wood color, meaning the color differences between heartwood and sapwood become less.
5. More efficient use of logs.- All teak logs procured from community teak plantations should be processed into useful products. This can be done by reconstituting the waste to become an acceptable dimension of wood products. A small dimension of log cut, log end, log with knots and end-splits, and other defects are glued together side by side to make lumber or beams. This lamination technique should be introduced to the small sized wood industry of the community.
6. Product diversification.- Moving the conventional and commercial products of furniture to the high products of housing components such as beam, truss, window frames and other items will increase the revenue of the community teak wood processors.

Products and end users:-

Teak has long been acknowledged for its excellent wood properties, making it one of the most sought-after multi-purpose timbers in the world. These properties, particularly for heartwood, include strength with lightness; durability; dimensional stability (due to a very low coefficient of expansion and contraction); non-corroding properties; ease of working and seasoning; termite, fungus, chemical, water and weather resistance and attractiveness (Keogh, 2009). The versatility of teak makes it suitability for a broad array of end-uses that are well documented - the best quality being used for high value furniture and boat decking and the smaller sizes used as a cheaper, utility timber. Specifically, where there is high humidity teak is ideal because it does not warp, twist or expand and its natural oils and resins (technoquinines) repel water and reduce insect or fungal attack. The dominant uses are in the furniture, doors and windows sectors (Somaiya, 2013).

Global furniture industry

The world's top producers of furniture are China, USA, Italy, Germany, India, Japan, France and Poland whilst the world's top exporters are China, Germany, Italy, Poland, USA and Vietnam. China remains both the world's largest producer and exporter (CSIL, 2013).

The furniture industry hasexpanded along with the recovery and expansion of the global economy since the financial crises of2008. In 2012, global furniture production continued to recover and was valued at $370 billion in2011 and by 2015, the global furniture market is expected to reach $436.5 billion. The value ofglobal furniture trade in 2011 was $109 billion. The United States is the largest furniture-importingcountry, with imports valued at $12.4 billion in 2011 (United Nations, 2012).

There is a strong relationship between housing and furniture: housing has been a leading indicator of economic recovery; a house purchase being a discretionary expenditure and sensitive to interest rates. Lower interest rates are usually effective in stimulating demand for new houses. When people buy new houses they also tend to buy new furniture and other objects for their house.
Wood furniture is a sub-set of the broader international trade in furniture and production/export patterns generally follow the broader furniture pattern. The largest importers of wooden furniture are the markets in Europe and North America (Figure 3), both of which are becoming increasingly

sensitive to the needs of legality and certification in wood trade

Factors influencing Global Teak trade and prices:-

Apart from the common suite of challenges to all international trade such as fluctuating exchange rates, government regulations and changing tax regimes and tariffs there are several other considerations which influence efficient global trade in teak.

Standards.

A lack of standards and consistency in establishing prices for teak logs has been a longstanding and common theme of discussions of international teak markets. Several expert observers have reflected upon this issue. Keogh (2009) observed "*…due to lack of standards, lack of information and misinformation there is widespread uncertainty and confusion around teak investments, particularly in relation to prices"* and suggested the establishment of an international pricing mechanism for teak, designed to provide standard, transparent, widely published and up-to-date information on plantation teak prices. Moya and Perez (2008) also reflected that "*…it is difficult to get accurate and regular wholesale and export prices for teak wood*". Ladrach (2009) concurred with these sentiments, observing "*The creation of uniform international log grades for plantation teak, along with standardized lumber and product grades would be of great help to improving the marketability of teak wood products. Standardized descriptions are needed so that buyers know the exact quality of the products being offered for sale*". Kollert (2013) reflected upon this theme in reporting FAO's detailed 2010 study on teak "*….the 2010 survey of teak prices proved to be particularly difficult. Firstly, there are no common international log grading rules established and the perception by the countries of a small size and big size logs proved to be rather different*".

Measurement of log volumes

There is no single internationally-accepted method for measuring logs which can allow reliable comparison of prices between countries. Log volumes can be calculated in several ways, each offering a legitimate (but different) result. What the grower produces in real cubic metres may not be the same volume which is traded. This can be a source of considerable misunderstanding and confusion - a grower wants to be paid for wood grown and the trader wants to pay only for wood which can be processed. Conversion factors have been developed to assist this important dialogue but are yet to be uniformly applied

FAO (2010) offers a practical example of the importance of adopting agreed conversion factors:
A practical example would be a timber sale appraisal that a sawmill is conducting to determine a bid price. The stand volume may be reported in cubic metres over bark but the purchaser may need to convert these volumes into inside bark volumes, weight or board feet3 to match their units of measure. To determine the value of the timber, the purchaser will need to know the cost of getting the timber from the stump to the mill site, thus weight to volume ratios are likely to be an important parameter for determining weight-based transport costs. Primary product recovery will need to be estimated using conversion factors from round-wood to the primary product, e.g., 2 m3 round-wood will produce 1 m3 sawn-wood. A material balance will be used to determine the quantity and thus value of the residual products made, and finally, ratios may be used to estimate the quantity of unmeasured

Some producer countries may use one method for calculating log volumes and dimensions and a purchasing country may use another as their standard. For example, producer countries in West Africa use the Brereton scale for calculating volume whereas in India (the world's largest teak market) the Hoppus system is used. A standard 20' container can hold up to 15 m3 (real volume) of small logs, but this may convert to about 13 m3 if the Hoppus system is applied and this can cause considerable confusion. There is an acknowledged need for producers and buyers to agree on a common form of log measurement or standardise allowances or agree on standard conversion factors to convert volume to true cubic volume.

Logistics and trade

The fragmented nature of the global teak estate across continents, countries and landholdings offers logistical challenges to the efficient sale of teak grown in plantations. Trades of teak logs may be shipped as break bulk cargoes, in containers or, where conditions permit, by truck. The commercial attractiveness of a planted teak resource is strongly influenced by the proximity to a suitable port, adequate road transport and infrastructure and sympathetic government regulations and services related to export procedures (such as tax, customs and quarantine clearance). International shipments of teak require an understanding of concepts of global shipping including containerisation, intermodal transport, non-vessel operating carriers and freight forwarders

Containers

Standard 20- and 40-foot shipping containers are becoming an increasingly common part of shipping for teak consignments. They offer efficiency for loading and unloading and transfer of cargo to other forms of transportation such as rail or truck plus a faster and more reliable delivery and logs arrive in better condition (Somaiya, 2013). However, containers do have limitations and cargoes are limited by dimensions and maximum weight limits (Table 2). Typically, a 20' container (TEU) can hold up to 15m3 of teak logs up to 5.8 metre length (13m3 Hoppus) or up to 19 m3 of sawn timber or squared logs (up to a maximum weight of 22 tonnes). A 40' container (FEU) can hold about 22 m3 logs, generally cut to 3.9 metre lengths or sawn timber up to a maximum weight of 26 tonnes.

In addition to the costs of ocean freight, containerised shipments need to meet charges for BAF (Bunker Adjustment Factor), ICS (International Carrier Surcharge) and port charges such as MSA (Maritime Service Authority), TDC (Terminal Destination Charge) and a series of agents' fees. Shipping costs for consignments of teak round and squared logs in 20' containers between the Solomon Islands and ports in China, Vietnam and India are of the order US$84 – 112/m3 and a Break-down of these costs is offered in Table 2:-**Standard dimensions of shipping containers:-**

Container size	Inside length (m)	Inside width (m)	Inside height (m)	Door width (m)	Door height (m)	Capacity (m3)	Tare weight (kg)	Maximum cargo (kg)
Standard 20'	5.89	2.33	2.38	2.33	2.28	33	2230	21700
Standard 40'	12.01	2.33	2.38	2.33	2.28	68	3701	26780

Teak wood prices are generally determined based on subjective (generally experienced) visual assessment of logs. There are no commonly accepted, systematic or consistent international grading rules with corresponding price values. An example of the many factors considered for calculating values of plantation-grown teak logs are combined in a draft set of Log Grading Rules established for the Solomon Islands (Appendix 1) (Laity and Ahsan, 2012).

International regulations, legality and certification:-

The global wood markets have become increasingly sensitive to timber sourced illegally or

unsustainably, with consumer companies applying voluntary verification (sustainability) standards and/or governments introducing involuntary regulatory (legality) compliance systems that influence market access and acceptance.
There is now increased focus within trade and aid policies to encourage developing countries to adopt higher levels of sustainability in forest management approaches and reduce incidences of illegal trade in forest products. It is now apparent that the major change occurring within international markets is that a demonstration of sustainability is no longer a primary requirement to access markets; management and governance systems must now demonstrate a commitment to legality of product and transparency of supply.

The large markets of North America and Europe have responded legislatively, building on the principles of certification and associated sustainability and environmentally responsible production.

The global resource and trade in teak:-

The global teak plantation resource of 6.8M ha is geographically spread across the seasonally dry tropics and is mostly less than 20 years of age. As a popular plantation species, new plantations continue to be established and the area planted to teak is expanding. Although the annual wood increment of global plantations is currently about 30M m3, only 2.0 – 2.5 M m3 are harvested annually and this can be expected to increase as the resource matures. Industry sources suggest that the mature plantation resources of West Africa are likely to decline as plantations have not been replaced and that the plantations of Central and South America are reaching maturity and supply from this region will continue to expand. In addition, some of India's 2.5 M ha of plantations, previously unavailable for commercial utilisation, may be made available to meet India's domestic demand if Government of India policies change.
An analysis of data available to this study indicates that some 1.3M m3 teak logs and sawn wood are currently being traded annually; a global trade worth an estimated US$723 million. The data demonstrates the importance of domestic processing which accounts for the remaining 1.2M m3 of harvested wood which is processed in the country of origin. The data firmly suggest that global trade is expanding and grew by 47% by volume and 58% by value between 2010 – 2012. "Burmese teak" sets international standards for quality and Myanmar is the world's largest supplier of teak logs and sawnwood, with exports growing by 50% between 2010 and 2012 and valued at $409 million in 2012. However, any future analysis of teak availability in global markets must account for a dramatic reduction in teak supply from Myanmar following implementation of its proposed log export bans and forest trade reforms scheduled to commence in April, 2014.

Importers of teak:-

There are four major importers of teak; India, Thailand, China and Vietnam. Of these, India and Thailand have protected resources of native teak and both are growers of plantation teak and exporters of teak products.
India is the world's largest market for plantation teak, representing some 75% of global trade. India's imports are expanding and have grown by 54% since 2010 with a marked increase in trade with Central/South America accounting for a large part of this increase. The increase in demand has been fuelled domestically by an expansion in the real estate market and a boom in construction of residential housing where teak is the preferred timber, particularly for doors and windows which account for some 40% of teak processed. Indian wooden furniture manufacture for domestic consumption and export is growing steadily with exports reaching $592 million in 2012. This sector is significant user of teak. An Indian policy response to the proposed log export ban from Myanmar may be to allow greater access to Government-managed teak plantations in India. Whilst having an impact upon Indian domestic supply, this is not expected to have a large impact upon trade from countries other than Myanmar.
India's import preference is for round or squared logs (rather than sawnwood) which takes advantage of India's low costs of processing and attractively low tariffs for roundlogs and squared

Whilst India remains the leading global importer of teak roundlogs and squared logs, China shows a strong demand for sawn timber.

Although China is the world's largest importer of wood and exporter of wooden furniture (US$17.5 billion in 2012), imports of teak logs to China are only 10% of those imported by India. Chinese imports of teak logs and sawn timber are expanding. In contrast to India where teak is used for buildings and doors/windows, in China the use of teak is dominated by manufacture of wood furniture for exports. Chinese processors of export furniture are becoming increasingly sensitive to the need to demonstrate use of legally-sourced wood.

Thailand is a grower of native and plantation teak and both an importer of teak logs and sawnwood and an exporter of finished and semi-finished teak products. The country has mature, sophisticated wood processing industries which have a heavy reliance upon Myanmar, particularly for supply of high quality teak from native forests. As in China and India, the proposed log export ban and policy reforms in Myanmar are likely to have a very large impact upon wood supply and industry output. This may result in an increase in illegally sourced high quality timber from neighbouring countries or a shift to utilisation of plantation grown timbers from both domestic and imported sources.

Vietnam has a vibrant, sophisticated and modern, export-oriented wood furniture industry which is dependent upon imported logs and timber. Despite the size of the industry, there has been a reduction in imports of teak logs and sawn timber. A possible explanation shared by processors has been the challenges experienced in obtaining legally certified supplies of teak to service industry demand. In contrast, supplies of competing plantation grown acacia and rubber have been in ready supply.

Influences in the global teak trade:-

There are a wide range of factors which influence global trade of teak, apart from the normal challenges of international trade such as exchange rates, changing trade policies and regulatory requirements, taxes and tariffs.
The global trade is teak is frustrated by a lack of standards and consistency in establishing prices for teak logs. Despite a considerable international dialogue, the lack of standards, lack of information and misinformation results in widespread uncertainty and confusion around teak investments, particularly in relation to prices. There is a rationale for provision of standard, transparent, up-todate information on plantation teak prices.
A potential source of misunderstanding in the teak trade is the confusion between methods of calculating log volume. Some producer countries one method for calculating log volumes and dimensions (e.g. Brereton) and a purchasing country (India) may use Hoppus as their standard. The entire industry supply chain in India is based upon Hoppus measurement and growers and suppliers who see engagement with the Indian market must be equipped with reliable standards and conversion factors to move between the two systems

Global wood markets are becoming increasingly sensitive to timber sourced illegally or unsustainably and the large markets of North America and Europe have responded legislatively through specifying prescriptive compliance measures. Confidential discussions with wood processors and wood product exporters in China, Vietnam, Lao PDR and Thailand indicate that importers have a strong preference

for imported wood which is clearly legal and, in some cases, certified. The ongoing competitiveness of the large Vietnamese wood furniture sector will depend upon compliance with legality requirements. Much of the export furniture market from Thailand and India are based upon teak and are heavily dependent upon the discerning markets of Europe and North America. This is a challenge which growers and processors of teak will need to address as a matter of urgency. Indonesia has completed domestic regulations to comply with a VPA with the EU and Vietnam is to follow suit. Although designed for the EU markets, the conditions of a functioning VPA will meet the requirements for export to the USA

Opportunities and challenges for Lao teak in global markets:-

The Lao plantation teak resource of 40 000 ha is located largely in the north, small and highly fragmented and almost entirely aged less than 20 years. As transport infrastructure improves and the resource matures, its proximity to major global markets of Thailand, China and Vietnam (and to a lesser account, India), will make it attractive for these markets. There have been reports (supported by Indian import data) that consignments of Lao teak squared logs to Thailand have been shipped to India. The burgeoning Indian industry offers possibilities to the Lao growers

The global furniture markets are very competitive and furniture manufacturers are extremely price sensitive.
Small-sized teak from Lao PDR must compete with other tropical hardwoods such as acacia and rubber wood and commonly traded temperate hardwoods. The teak available from Lao PDR is not differentiated from other small-sized plantation teak available from other sources in Asia, Central America and Africa and will have to compete to establish and maintain market share. To compete in the international markets, those trading in Lao teak will need to differentiate Lao teak in a positive way through:

- Price and quality (including efficient logistics)
- Selling in standardised form as round or squared logs and in standard sawn

wood dimensions required by the markets

- efficiency and ease of doing business through a sympathetic legal and regulatory environment
- Clear GoL processes to establish legality to meet EUTR and Lacey Act Requirements
- Reliability and capacity of growers to assemble commercial consignments
- Responsiveness to the needs of buyers

The fragmentation of the resource across many thousands of smallholders makes it challenging to assemble consignments of commercial size which meet market requirements of legality. Given the poverty which characterises many of the teak growing communities in Lao PDR, it is likely that Consignments will continue to be of small sized timbers as growers seek early financial returns through early harvest. Recognising both of these issues, the GoL has encouraged the establishment of growers' groups and adoption of processes to demonstrate legality and an informal dialogue has commenced with EU partners regarding a VPA.
There is an urgent need to complete an inventory of teak plantings in Lao PDR as the basis for planning efficient marketing programs. Once industry has basic information on location and age structure, commercial decisions can be made, consolidation can begin and contact made with reliable markets.

Traders provide a vital link between Lao PDR and the global markets and assume much of the risk entailed in making successful international trades. Locally, they will play a vital role in organising collection from small-holders to offer a consistent supply of quantity and quality to buyers. Those involved in the development of the Lao teak trade may care to moderate an obvious prejudice on the part of some against traders and middlemen; they are a necessary part of the value chain.
If Lao PDR continues to encourage Chain of Custody for its forest industry and Group Certification for its smallholder teak resource , and commits resources to gaining certification for its teak resources and processing facilities, then it is logical that marketing efforts be strengthened in countries which have a need for certified timber. For example, although India represents 75% of global markets, its dominant domestic market is not sensitive to the additional costs of certification. Vietnam, however, has a world class wood furniture industry which is 90% directed towards exports; these exports primarily to the markets of the EU and USA. Similarly, the Chinese and Thai furniture industries are export-oriented and have an obvious interest in both legality and certification. Certification will offer uncertain rewards unless reliable and regular buyers are located in these countries with a commitment to certification and legality. It is important that the costs and benefits of verification and certification programs are assessed fully to ensure that they are cost-effective for the growers.
The Lao resource of planted teak, a high value, smallholder-grown, tropical hardwood, clearly offers attractive investment possibilities for local processing rather than export as low-value 'squared' logs to other countries. Knowledge of international markets will offer Lao growers and processors an opportunity to achieve efficiencies and refinements such as focussed marketing, assured legality and an improved regulatory environment and make appropriate adjustments to the supply chain to successfully compete in markets for planted teak

Sustainability:-
Green Furniture Concept was born out of a deep desire to do good, take responsibility and always challenge ourselves and the industry to change for the better. We recognise the importance of considering the full life cycle of products, the materials used to make them and are always careful about the kind of chemicals used in our products. Our four sustainability cornerstones are: Chemical Awareness, Design and Resources, Reforestation and Post Sales Responsibility.
Chemical substances are everywhere in our lives. They might be the adhesive used to build our furniture, the dyes in our clothes or the salt on our food. Some chemicals are edible and safe, but others are toxic to humans, wildlife and the environment. The chemicals we use in production around the world are the chemicals we take into our homes and put into the natural habitats of wildlife. It is up to us to decide what kind of chemicals we want in our lives and which we can do without.

We carefully assess the chemical substances used in our furniture to make sure the products we deliver are free from eco-toxins and harmful substances. We collaborate with our suppliers and environmental chemists to evaluate and continuously improve our chemical footprint. The Nordic Eco-label is the bottom line for our work to improve chemical contents and raise chemical awareness. Our vision and goal are to exclude all SIN-listed substances from our products.

Design &Resources:-
There are two kinds of resources on this planet, renewable and finite. With a growing global population and faster manufacturing processes, resource scarcity is here to stay. That is why renewable resources (materials like wood) need to be regenerated at the same rate they are used. At the same time, we need a circular approach to using and reusing finite resources (materials like metals). It is essential to understand and keep this in mind when designing and developing the future.

We design our products using renewable and recyclable materials and use the highest possible percentage of recycled and up-cycled content. We never stop trying to find new and better production methods and materials.* We use wood from certified sources to help protect biodiversity and maintain viable use of the world's forests.
We think reuse rather than buy new. We use hard-wax oil** instead of traditional wood varnish so that our furniture can be repainted and any scratches can be easily touched up instead of replacing complete parts. But just in case something does need to be replaced or recycled, we design our products to make sure parts can be disassembled individually to minimise waste and separate materials for recycling.

Reforestation:-

The forests of our world are beyond amazing. They are places of great bio-diversity, they protect river basins and give us oxygen while reducing carbon dioxide in the atmosphere. Without a doubt, trees are some of the best things on the planet – and we need more of them

As a manufacturing company, we do take and use resources but we try to do so responsibly. Our wood components come from certified sources to support and guarantee responsible forestry. We also plant a tree for every product sold, to close the biological cycle we start when the trees we use are cut down. We want to replant where it matters and the most bio-diverse and complex forests around the world are the tropical rainforests, which is why we choose to replant the majority of our trees in Colombia.

Plant a tree, grow the future:-
As the furniture industry joins the fight for a sustainable planet, the world's forests may be the only weapons we need. Forests are the lungs of the planet, providing oxygen while reducing carbon dioxide in the atmosphere. Woodlands are places of great biodiversity, protecting river basins and enabling wildlife to flourish. Sustainable forestry can even boost local economies, providing disenfranchised communities with the materials, jobs and resources they need to survive.
Although many in our industry are taking a responsible approach, the deforestation associated with manufacturing is threatening the ecological balance. The consequences of deforestation are inspiring better management of wood materials, but few manufacturers are replenishing the resources they consume. That's why Green are replanting the trees we harvest to make our products, planting one tree for every metre of seating, and every Leaf Lamp, we produce. We established our first forest in 2008, planting 1,000 birch saplings near our production workshop in southern Sweden. Five years later, we established a second forest nearby, planting 500 cherry trees and 400 maples, then added another 1,000 birch saplings in 2016.
To be a truly sustainable furniture brand today, you need to have a strong commitment to raw materials at the deepest possible level.'
Joakim Lundgren, Head of Sustainability at Green.

Today, Green is embarking on another groundbreaking initiative: we're planting trees in places where they matter most. *'Replanting the trees we use in production makes sure that we maintain a renewable resource,'* says Joakim Lundgren, Head of Sustainability at Green. *'But we're also committed to making sure that the global amount of forestry doesn't diminish, so we're looking for ways to increase it. This is why we've decided to plant a forest in Colombia, contributing to a project that protects river basins, encourages natural habitats and produces the life-giving oxygen needed to sustain them.'*

Model Project Report.

1.0 Introduction

Teak (*Tectona grandis*) is one of the world's premier hardwood timbers, rightly famous for its mellow color, fine grain and durability. It occurs naturally only in India, Myanmar, the Lao People's Democratic Republic and Thailand, and it is naturalized in Java, Indonesia, where it was probably introduced some 400 to 600 years ago (Troup 1921).
Indonesia has a long history of growing teak as an exotic plantation. The species is believed to be introduced the first time in 14th century by Hindus (Simatupang 2001). Currently Indonesia is one of the world's largest teak grower. Most of the plantations have been grown in Java, where the largest grower is Perum Pehutani (state-owned forest corporation) which manages over 1 million ha of teak-bearing plantation with a net area of teak estimated to be around 6,00 000 ha. Community-grown teak plantations have been becoming of importance in producing teak log, not only in Java, but also in eastern Indonesia such as South Sulawesi, South East Nusa Tenggara and East Nusa Tenggara.
The trend of teak planting by farmers has been continuously increasing in recent years due to decreasing the log supply from state forest managed by Perhutani while the demand of teak-log is steadily increasing.
Teak log harvested from community-teak plantation has been stated to have low quality and consequently low price as well due to be harvested at much younger ages around 15-20 years compared with that of traditionally known of teak log from the state forest harvested at least at 40 years old. However, complete information on the productivity, log quality, wood properties and processing of teak log harvesting from community-grown teak plantations in Indonesia is still lacking. The present study is intended to gather this information with a particular reference to Java and eastern Indonesia which have a large size of community teak plantations.
The field surveys also collected information on a wide range of log dimensions and qualities at selling time harvested from short-rotation community teak plantations. During field surveys interviews with teak growers and processors were also conducted.
An extensive literature search was carried out in order to collate all sources of data and information related to community-teak grown plantations and teak log utilization harvested from the community teak plantations

India constitutes some 75% of the global trade in teak, followed by Thailand, China and Vietnam. Myanmar is the largest supplier to all of these markets; a supply maintained through harvesting of native forests. A large number of teak growers in countries of Central and South America, Africa and Asia make up the remainder of the trade, all based upon plantation-grown resource. Using a combination of data sourced from the Global Trade Atlas, the Indian Directorate General of Commercial Intelligence and Statistics (DGCIS) and the databases of Chinese, Vietnamese, Thai and Lao Customs, pricing and patterns of trade flows for these four major importing countries and Lao PDR and other suppliers have been established, quantified and trading partnerships identified. Constraints to efficient market linkages were identified. For example, the global trade of teak is frustrated by a lack of standards and consistency in establishing prices for teak logs. Lack of information and misinformation results in widespread uncertainty and confusion around teak investments, particularly in relation to prices. Another source of misunderstanding in the teak trade is the confusion between log volume measurements using Hoppus and Brereton scaling. Some producer countries use one method for calculating log volumes and dimensions and a purchasing country (e.g. India) may use Hoppus as their standard. . Stakeholders must be equipped with credible conversion factors to move between the two systems if they are to avoid misunderstanding and strengthen market links. Other emerging considerations influencing trade efficiency include certification and legality of logs and supply chains. . Teak is widely sought-after in furniture industries, some of which are not influenced by such issues whereas others are sensitive to the demands of legality and certification. It appears that these requirements meaningfully influence growers and processors, especially those who are dependent upon tertiary markets in North America and Europe. Some markets are influenced by differential tariffs applied to the import of round logs and sawn timber; some are influenced by the need to trade in containers or as break-bulk consignments.
Lao PDR has an estimated resource of 40 000 ha of plantation teak, 26 000 ha of which is grown by Small holders in the north. This resource is maturing and becoming of commercial interest to wood industries within Lao PDR and its neighbours China, Vietnam and Thailand and the more distant markets of India. To make best use of their resource, Lao stakeholders must be familiar with the broader international markets, both in regards to demand and access requirements, as part of

decision making processes. Without knowledge of market drivers, prices and trends, policy makers, managers and smallholder growers are at a disadvantage. Conclusions are reached regarding the nature of the existing and potential demands of the wider global market place and specifically from China, Vietnam and Thailand.

The likely influences of these demands upon the maturing resource ofteaks grown in Lao PDRand other countries .India is the second largest importer of Teak fabricated round blocks in the world after China.

Products	Teak fabricated round	Round table	Chair	Toy
% of 100%	60%	20%	10%	10%
Production in lakhs Nos	6000 Nos	2000 Nos	1000 Nos	1000 Nos

2.0 Type of Concern:-

New entrepreneurs may start their business as an individual, proprietary concern, partnership firm or a joint stock company. Individual & proprietary concern should have their PAN number and should preferably have a bank account. Partnership firms should execute a partnership deed as per Indian Partnership Act 1932 on a Non Judicial Stamp Paper as per the Stamp Act of the State Government and register the partnership firm with the Ministry of Corporate affairs. Details of procedure to be followed are available at:

http://www.mca.gov.in/Ministry/actsbills/pdf/Partnership_Act_1932.pdf. The joint stock company can be formed as private limited, public limited or producers company as per The Company Act 2013, the details of which are given on the website of Ministry as link http://www.mca.gov.in/MinistryV2/companiesact.html

3. **Products:-** *Teak Fabricated round, Round Table, Chair and Toy*

4. Storage and packing:-

5. Marketing:-Marketing of fruit and vegetable product is the biggest challenge. There are several popularbrands in the market, which act as an entry barrier for new teak fabricated round block products. Indian market isalso flooded by imported products. Therefore, new comers need to give maximumimportance to marketing of its products. It is always better to engage a professional agency for product branding and marketing. The units shall also allocate reasonable budget foradvertisement and promotion. The details of the product marketing are discussed in thissection.

6.0 Quality control and quality assurance:- BIS and IS

7.0 Project Cost

The major component of a small-scale fruit processing unit are land, building and civil works. A project cost of **Rs.74.78 Lakh** has been estimated. The details of project cost are given in **Table 2** and the individual components are discussed in this section

7.1 Land and land development

For a small scale fruit and vegetable processing unit, a plot of land measuring 0.5 acre, with built-up area of 3850 sq.ft is considered sufficient. The land should be free from any encumbrance and shall be mortgage able. The land should be classified as non-agriculture. Permission for non-agriculture use, wherever applicable, shall be obtained for the land. The cost of land up to a maximum of 10 per cent of project cost can be reckoned towards margin if purchased by the promoters for the project. The land can also be taken on lease and the lease period should be sufficiently more than the repayment period of loan. The lease land should be with an enabling clause for mortgage of land to banks or financial institutions. The land cost varies considerably from place to place. Land cost of Rs.2.50 lakh has been considered for this profile. Similarly cost of land development also varies from place to place

and should be considered on actual basis. Land development cost of Rs.5.0 Lakh rupees has been considered in the model.

7.3 Plant and machinery

Selection of plant and machinery is the most important decision for setting up a food processing unit. All machinery and equipments used in the processing line should have proper efficiency. The matching the capacities of different machines and equipments in a processing line require an expert guidance. Therefore, a suitable consultant/ food technologist should be appointed to set up a fruit and vegetable processing plant. The estimated cost of plant and machinery is**Rs.40.23 lakh.**

All the plant and machinery should be erected in sucha way that the material flow is unidirectional to avoid cross contaminations. The machineryshould not occupy more than 1/3rd of the total floor area for smooth operation of labour.Various plant and machinery proposed for this model are discussed in this section.

7.4 Miscellaneous fixed asset

In order to run a day to business, some other fixed assets like furniture & fixtures, computers etc. shall also be required for which a provision of Rs.2.0 Lakh is made

Table 2 Project Cost

Sl.No	Particulars	Unit	Qty	Rate (Rs)	Amount (Rs Lakhs)
1	Land	acre	0.5	500000.00	2.50
2	Land Development	Sq ft	20000	LS	5.00
3	Civil Work	Sq ft	2850	600.00	23.10
4	Plant and Machinery				40.23
5	Miscellaneous Fixed Assets				2.00
6	Preliminary and Preoperative Expenses				1.95
	Total				74.78

7.5 Electrical and other items:

Various machines have to be connected to electrical motors of suitable power ratings for supplying power to them. Accordingly AC-3 phase motors of different power ratings, varying from 2.50 Hp to 7.50 Hp will be required for powering various unit operations of the unit. The total cumulative Hp ratings of all these motors will be 55 Hp. The costs of electrical motors have been included along with the cost of plant and machinery

8.0 Water Requirement

The total water requirement of such unit will be 100 litres per day.

9.0 Manpower Requirement

Teak fabricated round blocks processing Unit is a highly labour intensive operation.
Majority of labour is engaged on contract basis during season. These labourers are skilled and mostly men folk. In order to perform day to day work, manpower requirement of a small-scale fruit processing unit is given in **Table 3**.

Table 3. Manpower required of Teak fabricated round blocks processing unit

Salary	Number	Salary in (per month)	Total (Rs in lakhs)
Plant manager	1	15000.00	1.80
Manager – Technical	1	10000.00	1.20
Supervisors	3	7000.00	2.52
Accountant	1	8000.00	0.96
Electrician/mech	2	6000.00	1.44
Peon	1	5000.00	0.60
Guard/watchman	2	5000.00	1.20
Total			9.72

In addition, seasonal contract labour during peak processing periods will also be required to be engaged. As a thumb rule an expenditure on wages @ Rs.250/- per MT of raw material is considered adequate.

10.0 Working Capital:

Working capital is the most crucial input for viability of any fruit and vegetable processing unit. The raw materials being seasonal in nature, fruit and vegetable processing units need to maintain high inventories. Nowadays, banks are free to finance working capital based on actual need of the borrower. A provision of adequate working capital needs to be considered by the financing banks. The banks provide Cash Credit Limit, commonly known as CC limit to the borrowers for meeting their day to day expenses. The different components of working capital are discussed in this section.

10.1 Raw material and packing material

The raw material required would be fruits and vegetables, which are directly procured from the farmers. Other inputs age generally available locally in general stores. As the fruits and vegetables are highly perishable in nature, raw material stock only for 7 days is considered for assessment of working capital

10.2 Work-in-Progress (WIP)

The raw materials need to be converted to semi-finished products and preserved for processing in future. Therefore, the WIP has been considered for 30 days.

10.3 Finished goods

Processed fruit and vegetable products can be stored for a period of 12 - 18 months at ambient conditions. However, finished product storage for 15 days has been considered to keep the inventory level under check.

10.4 Debtors

The fruit and vegetable are purchased from farmers by making cash payments. Therefore, no creditors have been considered.

The estimated working capital for the project is given in Table 4.

Table 4.Working Capital Assessment for F&V processing unit
Rs in lakhs

Sl.No	Particulars	Period (Days)	Yr-1	Yr-2	Yr-3	Remarks
1	Raw materials stock	7	0.71	1.65	2.12	
2	Work in progress	30	4.10	9.57	12.31	
3	Finished goods	15	2.23	5.37	6.74	
4	Debtors	30	4.45	10.75	13.49	
	Total current assets		7.03	16.59	21.16	
5	Creditors (current liabilities)	0	0.00	0.00	0.00	
6	Working capital gap		7.03	16.59	21.16	
7	Margin money for W.C.	25%	1.76	4.15	5.29	
8	Bank loan (CC Limit)		5.28	12.44	15.87	

11.0 Means of Finance

Financing to food processing falls under priority sector lending. The loans to units meeting the criteria of MSME are classified under MSME sector. Such units can be financed by any scheduled commercial banks, Regional Rural Banks and Cooperative Banks. Important terms and conditions of financing such units are discussed in this section

11.1 Margin money

The promoters of the units need to bring their margin as per the requirement of financing banks and also as per RBI guideline issued from time to time. The margin money varies from minimum 10 per cent to 25 per cent of project cost. We have assumed margin money of 25 per cent in this model scheme.

11.2 Bank loan

The promoters of the units can approach any financing bank for finance. It is compulsory to take bank loan to avail various subsidy schemes of government. Therefore, the promoters should be careful in deciding means of finance.

11.3 Grant & subsidy

There are numbers of incentive from Sate Government for promotion of food industry. Some of the states have formulated their Agro Industry Policy. The new comers should go through these guidelines. Various incentives are available depending upon location of the unit from District Industry Centres (DIC). Therefore, to take maximum advantage of these incentives, entrepreneurs may contact the District Industry Centres in their state.

Ministry of Food Processing Industry, GoI is implementing a centrally sponsored scheme for known as National Mission on Food Processing (NMFP) jointly with State Governments. The scheme will be operational during 12th Five Year Plan. Subsidy is available under this scheme for various purposes under food processing industries. GoI has appointed State Nodal Agencies for implementing this scheme in different states

11.4 Interest rate

The banks are free to charge rate of interest above its base rate within overall RBI guideline issued from time to time. It generally varies from customer to customer based on credit appraisal of the borrower. Base rate of a bank is a minimum lending rate below which bank is not allowed to lend. However, we have considered an interest rate of 12 per cent for working out the bankability of the model project.

11.4 Security

As per RBI guidelines, the banks are required to take adequate security for the loans extended by them. The borrowers should plan projects in such a manner that they have enough fixed assets to offer as security against bank loan. Various types of securities considered by the Banks are given here:

11.4.1 Primary Security

The land and buildings acquired with by bank loan are mortgaged to financing banks. The mortgage can be registered or equitable in nature. The plant, machinery and other miscellaneous fixed assets acquired by bank loan shall have to be hypothecated to the bank. The value of all these assets is known as primary security for the bank.

11.4.2 Collateral Security

As the value of primary assets, especially buildings and plant and machinery is not enough to cover the bank loan, the banks insists for mortgage of any other property or asset of the company or promoters. This is known as collateral security

11.4.3 Hypothecation of Stocks

All stocks, inventories and debtors are hypothecated to financing banks as security against the bank loan extended by them.

12.0 Financial Analysis

In order to test the financial soundness of business, key financial indicators are assessed. Based on historical data on cost and prices, techno-economic assumptions are made for preparation of this model. The key techno-economic assumptions are presented in **Annexure I**. The assumptions made might vary from place to place, hence need to be considered on case-by-case basis.

12.1 Financial indicators

Based on the assumptions on input and output parameters, an Income Expenditure statement (Cash Flow Statement) prepared is presented at **Annexure II**. The financial indicators like Net Present Worth (NPW), Benefit Cost Ratio (BCR), Internal Rate of Return (IRR) etc. analysed by discounting cash flow @15% discounting rate are given in **Annexure III** and summary is presented in **Table 5**.

Table. 5 Estimated Financial Indicators

Financial Indicators	Estimated	Requirement
NPW @ 15 % DF	43.96	Should be +ve
IRR	36.73 %	>15%
BCR	1.09	Should be >1.0
DSCR	1.68	Should be <1.5

12.2 Repayment period and debt service coverage ratio (DSCR)

The repayment period has been drawn by considering net surplus available for repayment. The bank loan with interest is repayable within 8 years with a grace period of one year. The details are presented in **Annexure IV.** The debt service coverage ratio based on assumed techno economic parameters is found satisfactory

13.0 Depreciation Schedule

There are two different methods for assessment of depreciation on fixed assets namely Written Down Value Method (WDV) and Straight Line Method (SLM). These methods are used invariably to submit the returns to Registrar of Companies & Income Tax Authorities. We have followed WDV method for computation of depreciation in the present model and the schedule of depreciation is presented in **Annexure VI**

14.0 Govt. Approvals/ Clearance Required

14.1 Prior to establishment

i. Registration of concern with Registrar of Companies (ROC)
ii. NOC from Local Bodies like Gram Sabha/ MC etc. - mandatory
iii. Consent to establish from State Pollution Control Board - mandatory
iv. Approval of Layout plan for construction – mandatory
v. Permission to dug bore well from Ground Water Survey and Development Authority (GSDA)
vi. Registration with District Industry Centre (DIC) for as Small and Medium Enterprise
vii. Application to State Electricity Board/ Authority for sanction of requisite power load

14.2 After establishment

i. Licence from FSSAI
ii. Permission to commence production from State Pollution Control Board
iii. Licence from Boiler Inspector
The list is only illustrative. The entrepreneurs should undertake an exhaustive study of all rules and regulations prior to establishment of any such unit. The new entrepreneurs may take help of suitable consultant to avoid unnecessary expenditure for compliance later on.

Annexure I

Techno Economic Parameters

Assumptions for working out economics of a 300 MT/ Annum capacity fruit and vegetable Processing plant

1. Total Installed Capacity 300 MT per annum.
2. The unit will operate in a single shift of 8 hours for 250 days.
3. Share of products considered is 60 per cent, 20per cent, 10per cent and 10 per cent for each canned pulp, pickle, jams and canned vegetables, respectively.
4. Capacity utilization: First year –30 per cent, second year - 70per cent and third year onwards - 90per cent.
5. Sales price will be Rs.62000/MT for pulp, Rs.5000/MT for pickle, Rs.60000/MT for Jam and Rs.62000/MT for canned products.
6. Power cost @ Rs. 6.0 per unit and that for fuel @Rs. 55.0 per litre.
7. Labour charges are considered as Rs.250 per metric ton.
8. Insurance charges for the fixed assets considered as 0.5% of the depreciated cost of the assets.
9. Interest on working capital considered at 14% per annum and interest on term loan considered at 12% per annum.
10. Margin money considered at 25% of the financial outlay.
11. Depreciation rate of 10%, 13.91% and 15% has been considered for civil structures, plant & machineries and miscellaneous fixed assets, respectively.
12. Repayment period of seven years with one year grace period has been considered.

Annexure II

Profitability Statement

i. **Installed Capacity (Cubic.ft)**

Installed capacity	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8
Teak fabricated round blocks	180.0	180.0	180.0	180.0	180.0	180.	180.	180.0
Round Table	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Chair	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Toy	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Total	300.00	300.0	300.0	300.0	300.0	300.0	300.0	300.0

ii. Capacity Utilisation (cubic .ft)

Installed capacity	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8
Capacity utilisation	30%	70%	90%	90%	90%	90%	90%	90%
Teak fabricated round blocks	54	126	162	162	162	162	162	162
Round Table	18	42	54	54	54	54	54	54
Chair	9	21	27	27	27	27	27	27
Toy	9	21	27	27	27	27	27	27
Total	90	210	270	270	270	270	270	270

iii. **Sales Revenue (Rs. Lakh)**

products	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8
Teak fabricated round blocks	28.08	65.52	84.24	84.24	84.24	84.24	84.24	84.24
Round table	9.72	22.68	29.16	29.16	29.16	29.16	29.16	29.16
Chair	4.77	11.13	14.31	14.31	14.31	14.31	14.31	14.31
Toy	4.95	11.55	14.85	14.85	14.85	14.85	14.85	14.85
Total	47.52	110.88	142.56	142.56	142.56	142.56	142.56	142.56

iv. Expenditure Calculation (Rs. Lakh)

Particulars	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8
Raw materials Teak wood	25.223	58.84	75.66	75.66	75.66	75.66	75.66	75.66
Packing items	6.94	16.19	20.82	20.82	20.82	20.82	20.82	20.82
Fuel	0.41	0.96	1.23	1.23	1.23	1.23	1.23	1.23
Power	1.20	2.79	3.59	3.59	3.59	3.59	3.59	3.59
Salary	0.42	0.98	1.26	1.26	1.26	1.26	1.26	1.26
Wages	2.92	9.72	9.72	9.72	9.72	9.72	9.72	9.72
Repair and maintenance	0.00	0.07	0.18	0.35	0.53	0.53	0.53	0.53
Insurance	0.29	0.25	0.22	0.19	0.17	0.15	0.13	0.11
Promotion and marketing	0.12	0.28	0.36	0.36	0.36	0.36	0.36	0.36
Administrative overheads	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Total	37.60	90.18	113.12	113.27	113.42	113.40	113.38	113.36

3. Details of agencies who can provide Guidance (CSIR, MSME_TC, Sector councils, etc):-

For more information refer to **IS 15457: 2004**.
Source: - 2016 Indian Institute of Technology, Kanpur
1. **For further details please contact**: The Director, Indian Plywood Industries Research &Training Institute, Post Bag No.2273, Tumkur Road, Bangalore-560 022 Telegram: IPIRTI, Bangalore Tel. Nos: Director : 080-28394341, 080-28395970 General : 080-28394231/32/33 Fax : 080 - 28396361 e-mail: contact.

2. Physical and mechanical Lab atIndian Plywood Industries Research & Training Institute
(Autonomous body of Ministry of Environment, Forest & Climate Change, Govt.of India)
Post Bag No.2273, Tumkur Road, Yeshwanthpur PO, Bangalore - 560 022
Phone: 080 28394231,32,33, 30534000
Fax : 080 28396361, E-mail:contactus@ipirti.gov.in

Testing Service:-

1. Phsical and Mechanical testing Lab
2. Temperature and Humidity Control Chamber (climatic chamber)
3. Humidity control chamber
4. Tests for Door Shutters and others
UTM-10 ton,
UTM-5 ton,
Tensometer-2 ton,
Acoustic Pulse Tester,
Smoke Density apparatus,
Vacuum-steam pressure test apparatus,
Thermal conductivity apparatus
Temperature and Humidity control chamber
Hot water Bath 3 nos,
Air circulated Hot Air oven, 2 nos,
Varying Humidity chamber,
Door Testing Equipment,
Temperature and Humidity control chamber,
Hot water Bath 3 nos,
Air circulated Hot Air oven, 2 nos,
Varying Humidity chamber,
Door Testing Equipment,
Mechanized E Tester – NDT,
Electronic Balance – 2 nos,
Abrasion Tester,
End immersion tank

Details of Machinery Manufacture & suppliers:-

1. Manufacturer and supplier, 1030/740, Nakoda Industrial Estate
Near Krishna Dharma Kanta Basni- IInd Phase, Jodhpur
Rajasthan - 342 006, India Ph: +91-291-3291313 Fax: +91-291-2745918

2. Classic Timbers, Exporters of teak wood. 19 West Cross Ashoka Road, Mysore
Karnataka - 570 001,India Ph: +91-821-2480467
3. **Cosmopolitan Handicrafts Export,** Manufacturers and exporters, Pushpa Bhawan,
Near Railway Hospital, Jodhpur, Rajasthan - 342 001, India Ph: +91-291-2430268 Fax: +91-291-2430268,
www.cosmopolitanhandicrafts.com

4. **Crystal Creations,** Manufacturer and Exporter, TA-95, 1st Floor, Tughlakabad Extn, Main Okhla Road,
New Delhi- 110 019, India Ph: +91-11-55791673 Fax: +91-11-26059777

5. **Indian Furniture Inc. (Fur) Indian Furniture, Sri Tarun Agarwal, H-74, Shastri Nagar Jodhpur, Rajasthan, India, Postal Code: 342003, Ph:+ 91-291-2644755**
Fax: +91-291-2644755, www.thevinayak.com
6. **Indian Timber Products Pvt. Ltd.,Manufacturers and exporters, 604, Swarnajayanthi Complex , Ameerpet, Hyderabad, Andhra Pradesh - 500 038, India Ph: +91-40-23757768/ 23757527**
Fax: +91-40-23757527

7. Sri Krishna Saw Mill And Wood Works, Exporters No 275/7, New Timber Yard Layout
Mysore Road, Bangalore, Karnataka - 560 026 India, Ph: +91-80-6743151 Fax: +91-80-6743712

8. Teakstar India (Log) Parag Shah, D. S. Trade Centre, Station Road, Vidyavihar West
Mumbai, Maharashtra, India, Postal Code: 400086, Ph: +91-22-65565576, Fax: +91-22-25105576
www.teakstar.com

9. Royal India Exports & Imports, Kottayam India, Phone: 0091860655468,
Email:tkuruvilla30@yahoo.com
10 Jawahar Saw Mills Pvt Ltd, Jawahar 47, Victoria Road, Mustafa Bazaar
Mumbai-400010,India, Phone:+919820284447, Email:gaurav.agicha@jawahar.in
URL:www.jawahar.in

11. Typical Teak Panni code Post Mukkam, Kozhikode,Kerala-673602, India, Phone:9447 21 94 11
Email:teak@typicalteak.com, URL:www.typicalsuppliers.com

12. Mr. RT Somaiya, Self Employed Consultant, 2/4 Hind Society, Sion- Chunabhatti
Mumbai- 400022, M S, India, Phone: 912224077614,Email:rtsomaiya@gmail.com

13. The Western India Plywoods Limited, (V/P) Mill Road, Baliapatam , Kannur Dist, Kerala State
India PIN - 670 010 Ph : +91-497-277815, Fax: +91-0497-2778181 info@pressboards.com

Bonafide Exports:-

Teak Raw materials suppliers / Traders in India:-

1. A. K. Lumbers Ltd., Manufacturers suppliers and exporters of teak wood ,
92/4, WHS-II, Kirti Nagar, New Delhi - 110 041, India Ph: +91-11-51421758,Fax: +91-11-51421360

2. Adbhuta Manufacturer and Exporter, 661, Silver Oak Marg, Ghiltorni M.G.Road
Delhi - 110 030, India Ph: +91-9810192799/9811034406 Fax: +91-11-25752253

3. Agarwalla Enterprises, Sri Rakesh Goyal, 23/60 Punjabi Bagh West, New Delhi, India
Postal Code: 110026, Ph: +91-11-28342262

4. F **Ajay Wood Products,** Manufacturers and Exporters Bilaspur Road
Village Harnoli, Jagadhri, Haryana - 135003
India Ph: +91-1735-254177/230138 Fax: +91-1732-254166, Fax: +91-11-25220083

5. Akanksha Enterprises , Sri Sundeep Damani, Director, Arundale Beach Road, 3rd Street, Chennai, Tamil Nadu, India Zip/Postal Code: 600 090,Ph: +91-44-24460673, Fax: +91-44-52187549

6. Ak-square & Co.(W/D) Sri Aditya K.K, Sales & Exports, #301b, Aoc Apartments, Plot 35&36, Brooke Bond Colony, Secunderabad, Andhra Pradesh, India Zip/Postal Code: 500015
Ph: +91-9848-983982, Fax: +91-9848-983982

7. Alankar Timber Suppliers of all kinds of teak wood, Behind Patidar Samaj, Nagpur Road Jabalpur, India Ph: +91-98-33549211

8. Alleppey Veneer Industries (V/P) Sri Shanavas Thazhakath
Vadackal, Alleppey, Kerala, India Postal Code: 688003, Ph: +91-477-2262566, Fax: +91-477-2262566

9. Ambalika Plywood Private Limited, Manufacturer and Exporter, 2449, Club Colony Civil Lines, Jagadhri, Haryana - 135 003, India Ph: +91-1732-241708/241657/245709
Fax: +91-1732-245709/241657

10. **Anjana Exporters,** Manufacturer Anjana Niwas, Shreenagar Colony , Gita Mandir Road Ahmedabad, Gujarat - 380 022, India Ph: +91-79-25354969 Fax: +91-79-25320649

10. **Ansh Impex,** Supplier of teak wood 2/A, Pithle house, Mumbai, Maharashtra - 400 007 India Ph: +91-22-45647575

11. **Anteak Concepts & Designs Pvt.Ltd (Sp) Sri Ashta Bassi,** CEO
45/77 West Punjabi Bagh, New Delhi, India , Postal Code: 110026
Ph: +91-11-52463546, Fax: +91-11-25226177

12. **Anuradha Timbers International,** Exporters of Timber 244 Chinnatokatta New Bowen ally, Secunderabad, Andhra Pradesh - 500 033
India Ph: +91-40-55212511 Fax: +91-40-27750252

14. Timber Track Exporters and suppliers of teak wood , Ferry Road, Valapattanam, Kannur Kerala - 670 011 India Ph: +91-497-2778593/2775214/9895492562 Fax: +91-497-2775214

15. Siddhi Manufacturer and supplier of teak wood, A 3/E, Sunder Path, Banipark, Jaipur Rajasthan - 302 016 India Ph: +91-141-2208078 Fax: +91-141-2208303, www.siddhi-india.com

16. Lakshmi Furniture and Decorators, Manufacturers and suppliers , C-25, Sec-9, Noida Uttar Pradesh - 201 301 India Ph: +91-120-2540094 Fax: +91-120-5322736

17. Landmark Stone Engaged in supplying and exporting teak wood items , 47-48, Manik Vilas Colony Near Railway Station, Gwalior, Madhya Pradesh - 474 002, India Ph: +91-751-5011271/5011273
Fax: +91-751-2230204

18. Laxmi Timber Traders (Log), Rupesh Patel, Director, Goodshed Road, Trichy, Tamil Nadu India Zip/Postal Code: 620002 Ph: +91-0431-2700209, Fax: +91-0431-2711209

19. M K M Impex (W/D) , Suresh M K , Timber Swan S4s.Ad.Kd.Exports, No.240 appar Street, Senthil Nagar, Chennai, Tamil Nadu, India, Ph: +91-44-32944973, Fax: +91-44-26360484