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Bamboo Resource Status and Business Opportunities in Jharkhand

Prepared by



Foundation for MSME Clusters (FMC)
September 2019

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Abstract:

The report is an attempt to present an overview of bamboo production and trade in India and the world, understand the current situation in Jharkhand and explore opportunities to add value to the lives of thousands of people who depend on bamboo for their livelihoods

Disclaimer:

This publication has been produced under the Action: "Promote Bamboo MSME Clusters for Sustainable Development" with the financial assistance of the European Union and the Mukhyamantri Laghu Avam Kutir Udyam Vikas Board, Department of Industries, Government of Jharkhand.

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Project Partners & Associates



Message from the Honourable Chief Minister

I congratulate the Mukhyamantri Laghu Avam Kutir Udyam Vikas Board, Department of Industries, Government of Jharkhand for taking up this initiative to build up and strengthen the bamboo sector ecosystem in the state of Jharkhand. I also want to thank the European Union, the SAARC Development Fund and NABARD who have funded two long term initiatives in Jharkhand through the Foundation for MSME Clusters, SIDBI CEMCA and Copenhagen Business School.



It gives me great pleasure to learn that the Foundation for MSME Clusters (FMC), with the support of Mukhyamantri Laghu Avam Kutir Udyam Vikas Board has come out with this Publication to give an overview of bamboo production and trade in India and the world that will help explore the opportunities to further the bamboo based industry in the economy of the State of Jharkhand. India has over fifty lakhs people that are partly or fully involved in production or utilization of bamboo, be it for food processing, handicrafts, utilities, furniture and engineered bamboo. The recent policy changes that announced bamboo as a grass, has provided the necessary fillip in promoting bamboo growers as well as bamboo-based industry to its fullest potential. I am sure that this publication will help all the bamboo entrepreneurs present in Jharkhand and also several other states of our country and similar economies across the world to learn and benefit from.

I also take this opportunity to thank all the international delegates from the member countries of SAARC who have taken their time out to collaborate and build mutually beneficial partnerships among the stakeholders of their countries and those of the state of Jharkhand. I wish to reiterate the commitment of our Government to support all these initiatives in line with the articulated Vision and Objectives of the National Bamboo Mission.

A handwritten signature in blue ink, appearing to read 'Raghu'.

(Shri Raghubar Das)
Chief Minister
Jharkhand, India

Preface

Jharkhand is the land of immense opportunities with abundant natural resources. Bamboo which is also called the golden grass provides livelihood options to lakhs of artisans with mainly the local markets and local products which are being used by the masses both in the villages and urban areas. Thanks to the visionary foresight of the honourable chief minister who has embarked upon the journey of building a new Jharkhand.



We are aware that Bamboo has a range of qualities which can be harnessed to produce contemporary products for national and international markets. Fortunately, we have several existing institutions and private sector entrepreneurs who have the capacity to harness this potential. They come from within the state and also from across the country. In the new ecosystem we will not only connect with all the existing institutions but also help create and nurture new facilities That will be community owned and professionally managed.

I take this opportunity to thank all our partners and collaborators who have come forward with great deal of enthusiasm and brought in the knowledge that has been kept incapsulated in this document. I hope that hundreds and thousands of new and existing Entrepreneurs will use this knowledge to set up and expand their businesses and contribute to a vibrant and progressive Jharkhand.

The Foundation for MSME clusters (FMC) in partnership with SIDBI, CEMCA and Copenhagen Business School have together initiated an integrated Bamboo-based enterprise development project with support from the European Union-Switch Asia grant program to help the state of Jharkhand undertake a comprehensive ecosystem building initiative. This builds on an existing similar initiative targeting Dumka with financial support from the SAARC Development Fund and the NABARD. We are working in close association with all these institutions in furthering the new version of our honourable chief minister and harness the stated objectives Under the National Bamboo Mission.

A handwritten signature in blue ink, appearing to read 'K. Ravikumar'.

(Mr. K. Ravikumar), IAS
Secretary, Department of Industries
Government of Jharkhand

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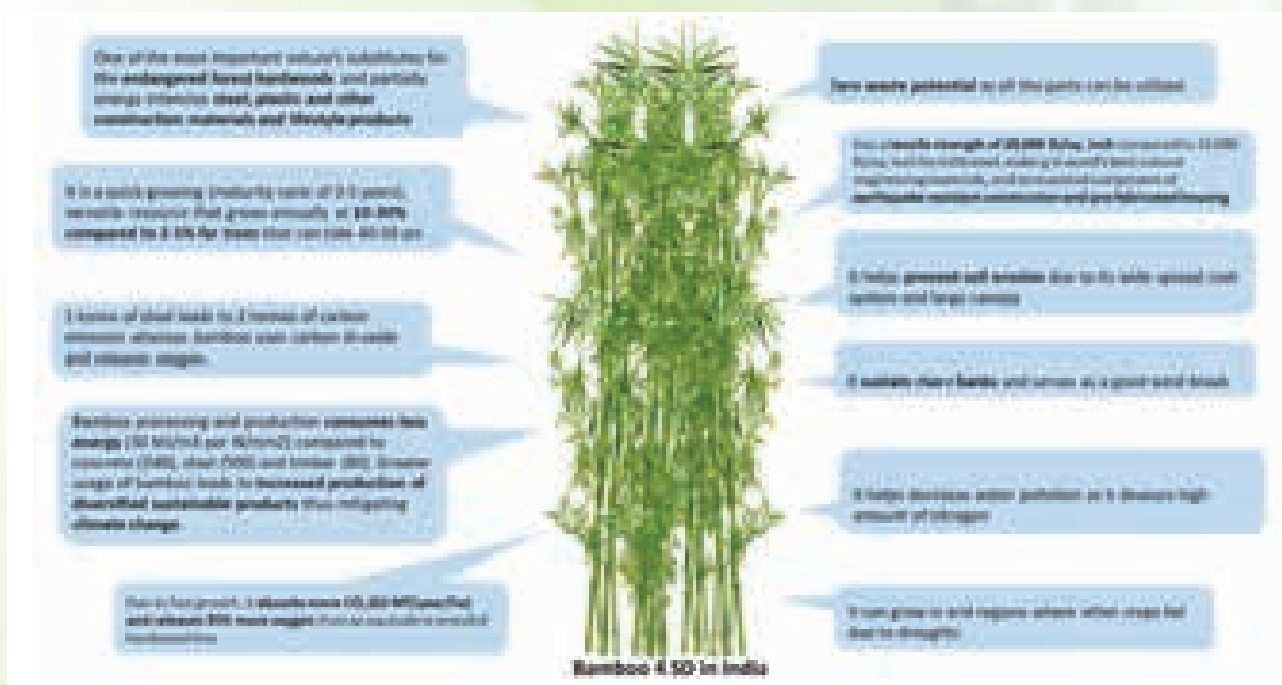
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Bamboo – an Overview

Bamboo has a prominent role in our economy since time immemorial and is a mainstay of life (especially rural) and culture of our country. Given its wide range of uses and versatile nature, it is also commonly known as 'poor man's timber' and 'green gold'. It belongs to Poaceae (Gramineae) family and is commonly found in Asia, Africa and Central and South America covering vast tracts of land, especially in South, East, and Southeast Asia. More than 90 genera and 1,200 species of bamboo are found globally. Of them over 500 species are found in China alone and more than a 100 species each are found in Japan, India, Indonesia, Myanmar and Malaysia.

Bamboo is one of the fastest growing plants and can easily adapt itself to a wide range of climatic and soil conditions. According to FAO, their size can range from only a few centimetres (dwarf bamboo varieties) to as big as 30 meters tall and up to 30 centimetres diameter. It is one of the most important natural substitutes for the endangered forest hardwoods and partially for energy intensive steel, plastic and other construction materials and lifestyle products. It is a quick growing (maturity cycle of 3-5 years), versatile, non-timber forest product that grows annually at 10-30% compared to 2-5% for trees that can take 50 years. Moreover, bamboo has almost a zero waste potential as all the parts can be utilized efficiently to make diverse range of products.



Various environmental benefits can be seen in the following figure

(Source: Foundation for MSME Clusters)

1. World Bamboo Resources, FAO, 2005

Production in India

Bamboo grow in all parts of the country, except Kashmir. According to Forest Survey of India, India is home to 125 indigenous and 11 exotic species of bamboo belonging to 23 genera with more than 50% of them growing in Eastern and North-Eastern India in the states of Assam, Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Nagaland, Tripura, Sikkim and West Bengal. Some of the main genera found in India are Arundinaria, Bambusa, Chimonobambusa, Dendrocalamus, Dinochloa, Gigantochloa and Indocalamus amongst others (FSI , 2017). Some of the important commercial bamboo species grown in India are B. bambos, B. balcooa, B. cacharensis, B. polymorpha, B. nutans, Dendrocalamus asper, D. hamiltonii, Thyrostachys oliveri and Melocanna baccifera (National Bamboo Mission).

According to India State of Forest Report 2017, the total area under bamboo in India is estimated at 15.69 million hectares, which is 1.73 million hectares more than the estimate of 2011, showing an increase of approx. 13%. Taken along with the FAO data between 1990 and 2005, it shows an increasing trend in both area under production and growing stock. The total green weight of bamboo culms is estimated as 189 million tonnes in 2017, which is 11.5% higher than that of 2011

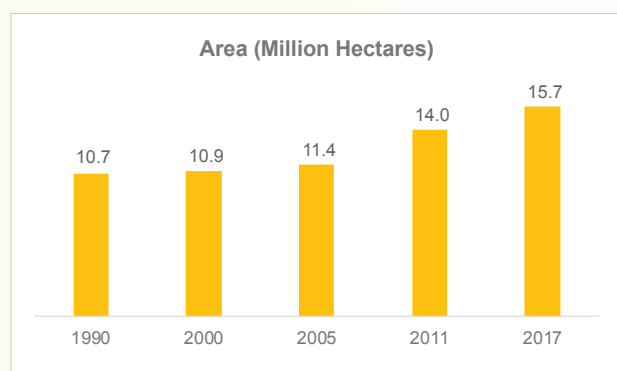


Figure 1: Production of bamboo in India

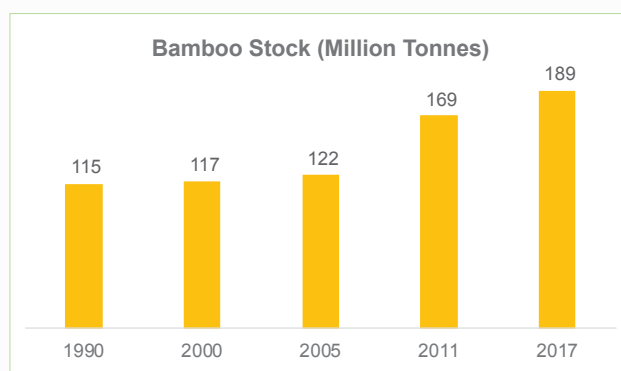


Figure 2: Area under bamboo in India

Data: FAO and Forest Survey of India

At a global level, India is one of the largest producers of bamboo. The last comprehensive global study on bamboo resources was done by the FAO in 2005 and the absence of current data on this topic limits recent cross-country comparison. According to FAO data, India had the largest area of over 11 million hectares under bamboo production accounting for nearly half of world's area, followed by nearly 5.5 million hectares in China. However, the productivity in India was much less than China. The other leading producers of bamboo are given in the following chart.

1. State of Forest Report, Forest Survey of India, 2017
2. <https://nbm.nic.in/BambooSpecies.aspx>

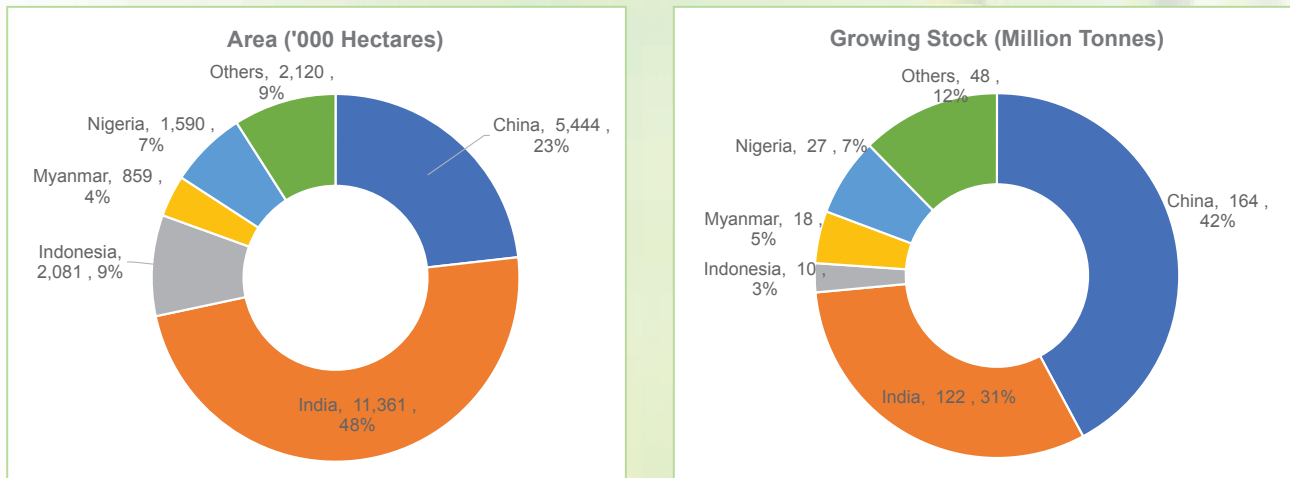


Figure 3: Global production of bamboo and area under production

Data: FAO

Bamboo Cultivation in Jharkhand

In 2017, Jharkhand ranked 13th in area under bamboo cultivation amongst Indian states at 4.5 Lakh hectares and had a stock of 25.2 Lakh tonnes, which is 1.3% of the total stock of the country. The key statistics of bamboo growing stock in Jharkhand is given in the below table and charts:

Table 1: Key statistics for bamboo in Jharkhand

Indicator	Growing Stock	Share of India
Bamboo bearing area within the forest (Sq. Km)	4,470	2.85%
Total number of Culms (million)	666	2.37%
Total green weight equivalent of Culms ('000 tonnes)	2,520	1.34%

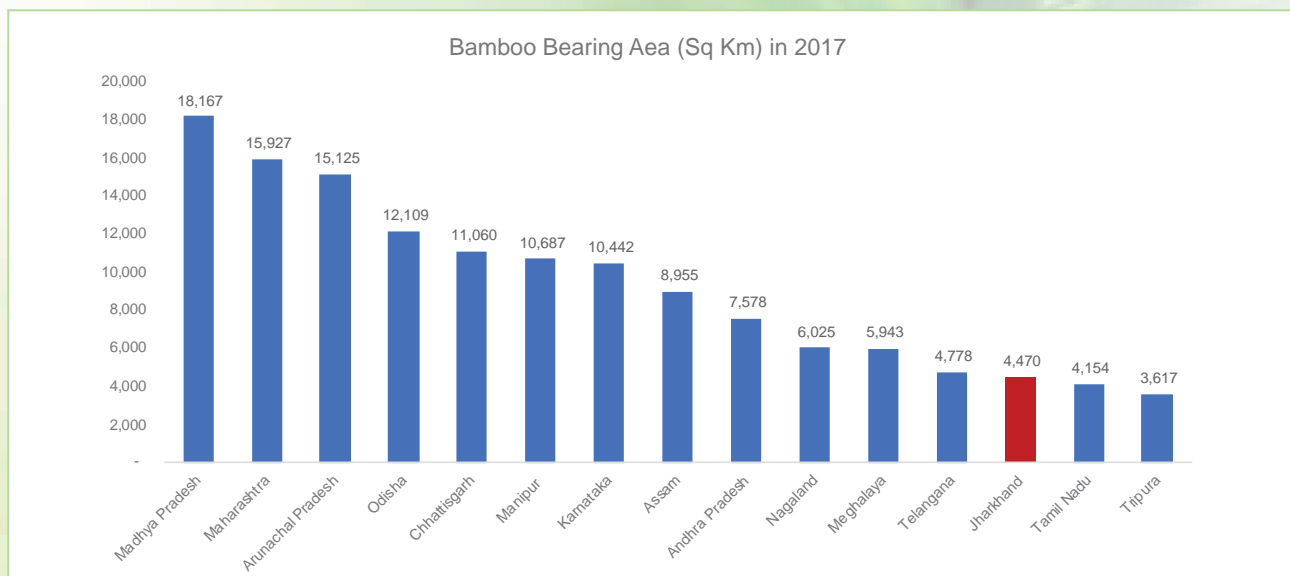


Figure 4: Bamboo bearing area in key Indian states

Data: Forest Survey of India

Despite the low production base, bamboo cultivation has witnessed good progress in Jharkhand. Compared to the 2011 levels, the total bamboo stock in the state in 2017 grew 131% from 10.9 Lakh tonnes to 25.2 Lakh tonnes. The bamboo bearing area went up by 24% from 3.6 Lakh hectares to 4.5 Lakh hectares during the same period. At the density level, this shows a remarkable increase from 661 bamboo culms per hectare to 1,490 culms per hectare, which is a growth of 125%.

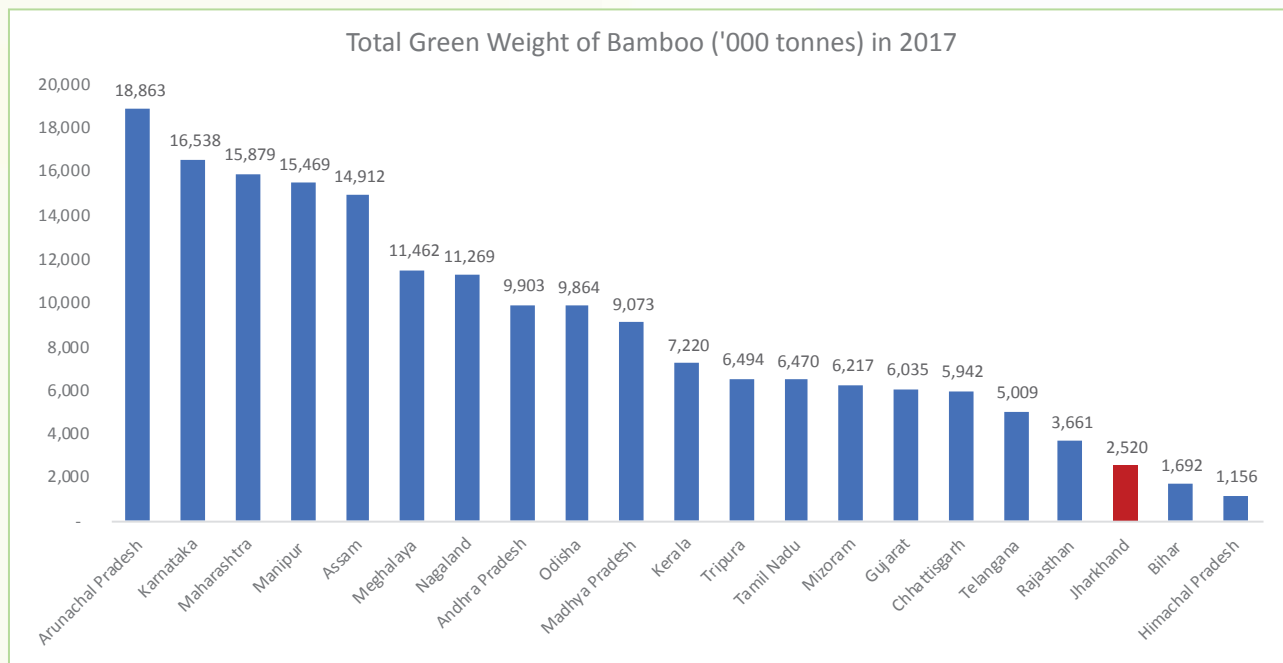


Figure 5: Bamboo production in key Indian states

Data: Forest Survey of India

Uses of Bamboo

Bamboo has been in use in Jharkhand for a long time. The tropical climate of this region facilitates its growth and the abundance of raw material has enabled the local artisans to make needed products and master the craft over time. Since a long time, the tribes of the region have mastered the skill and have been making day to day products such as baskets, vase, mats and other handicraft items. Bamboo has had industrial use in Jharkhand as well as it has been known to be used as raw material by paper mills.

According to International Bamboo and Rattan Organisation (INBAR), there are more than 10,000 documented uses of bamboo globally, and both the use and trade are likely to grow at a fast pace. Some of its prominent uses includes utilities and crafts, construction material, laminated panels, boards, mats, prefabricated houses, pulp, paper, fabrics and clothing, musical instruments and food. The distribution of consumption or use of bamboo in India is given below. 25% of it is used in housing industry for scaffolding and handicrafts remain to be the second largest area of consumption.

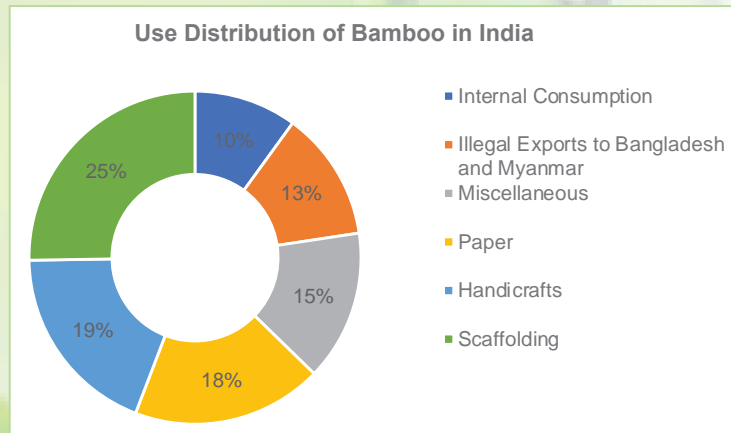


Fig 6: Consumption distribution of bamboo and bamboo products

Source: National Bamboo Mission, Ministry of Agriculture

Craft and Lifestyle Products

A range of handicraft and handloom items are prepared from bamboo for decorative as well as utility purposes. Examples include baskets, lamp shades, trays, flower vases and other items. Bamboo sticks, strips are woven into products of varying width and meet requirements, mostly in upholstery category such as table mats, runners, window blinds, curtains, and screens.



Furnitures

Bamboo along with cane is widely used for making furniture including tables, chairs, bookshelves, corner tables. North-eastern states of India are very popular for their bamboo furniture and these can be found in use across the country in both rural and urban areas.



Photo Credit: National Bamboo Mission

Construction Material and Housing

Bamboo is widely used in the construction sector owing to its high compressive strength and low weight.

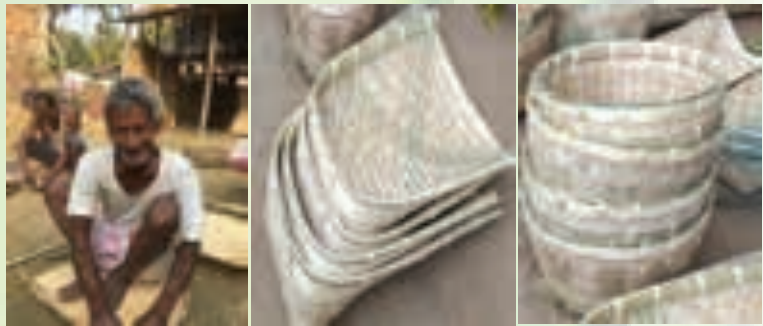
As highlighted before, scaffolding (supporting concrete structures while construction) comprises of the largest share of bamboo use in India. Apart from that bamboo is also used in the housing interiors such as roofs, floors, walls and fencing. In some regions, houses are almost entirely made of bamboo. It has also been used to make bridges.



Photo Credit: National Bamboo Mission

Utilities

Bamboo has long been and continues to be a major source of utility products widely used in day-to-day items. Agarbattis, toothpick can be seen in use all across the country, whereas baskets, supa (winnowing trays) and mats are in universal consumption across the rural areas. Other items include utensils such as plates, trays, spoon, forks and chopsticks.



Food

Bamboo shoots are a popular source of food and nutrition in many parts of the world including the North-Eastern and Eastern parts of India as vegetables and pickles. They are rich in vitamins, cellulose, amino acids and fibre. With the popularity of Asian cuisines, they are also becoming popular globally.

Fabric and Fashion

Bamboo fibres are used to make yarns and fabrics as they are known for their anti-microbial, hypoallergenic (do not cause skin irritation), breathable and thermo-regulating making it fit to wear in all seasons. Bamboo fibres are soft and are valued for their eco-friendly properties. They are also used in sanitary applications as sanitary towels and absorbent pads.

Carbon Sequestration and Renewable Energy

According to the International Bamboo and Rattan Organisation (INBAR), Bamboo is useful for climate change mitigation due to its carbon sequestration capabilities as it is one of the fastest growing plants in the world. It can absorb nearly 400 tonnes of carbon per hectare. Due to its fast growth, bamboo is considered a good source of renewable energy as charcoal and biomass.

Bamboo Craft In Jharkhand

Bamboo Resources of the State

As per the study by Institute of forest productivity, ICFRE, Ranchi in 2012, bamboo species such as Bambusa Bambos, B. Nutans, B. Tulda and Dendrocalamus Strictus are most common in Jharkhand and can be found both in forests and homesteads.

Natural Bamboo Resources

According to the study, fourteen forest divisions cover more than 80% of total Bamboo Overlapping Area with the forests in Jharkhand, with availability varying from 1% to 36% as shown in the below table. Divisions with high % of areas under bamboo in the forests are Koderma, Chatra North, Dhanbad, Latehar, Chatra South and Garhwa South.

Table 2: Bamboo resources in Jharkhand

Division	Forest Area (in Ha.)	Bamboo Over Lapping Area (ha)	% of forest Area
Chatra (North)	87,607	24,690	28.2%
Chatra (South)	101,893	21,447	21.0%
Daltongunge (North)	52,617	515	1.0%
Daltongunge (South)	72,679	6,231	8.6%
Dhanbad	26,380	6,291	23.8%
Giridhi + Bokaro	163,197	13,863	8.5%
Gumla	126,759	4,926	3.9%
GARhwa (south)	124,135	24,004	19.3%
Hazaribagh (East)	88,541	7,951	9.0%
Koderma	80,635	29,073	36.1%
Latehar	132,384	28,831	21.8%
Ranchi East	93,443	3,565	3.8%
Ranchi West	100,034	10,094	10.1%
Total	1,250,304	181,480	14.5%

Source: Bamboo Resources of Jharkhand, ICFRE Ranchi, 2012

(Note: East Singhbhum and few other areas also have bamboo resource, however, this was not covered under the above quoted source of report and thus the data is not captured in the above table)

Homestead Bamboo Resources

The cultivation of homestead bamboos is done on culturable wastelands and lands otherwise not suitable for agriculture. In some cases, bamboo plantations have also been done on agriculture lands. The most common species in non-forest areas of Jharkhand are B. nutans, D. strictus and B. tulda. B. nutans is planted for diverse household uses. However, in Baheragora, Chakulia and Dhalbhumgahr blocks of East Singhbhum, it is cultivated as cash crop and is the major source of income for the villagers.

Economic Condition of Artisans

The bamboo artisans primarily belong to vulnerable communities and have limited ownership and access to resources. They lack access to market, better production technologies and orientation on market trends. Most of them don't even own land and their financial situation is weak. All this makes even access to finance difficult in the absence of collateral. Those who lend (NBFCs and moneylenders), charge high interest rates as compared to the nationalized banks. The work for these artisans varies across the year due to demand cycles and agriculture season. On an average, the monthly income of a bamboo artisan is estimated to be around Rs 3,000 per month.

Seasonality of Bamboo Work

Most of the bamboo artisans are farmers as well and divide their time depending on the seasonality of work in bamboo and agriculture sector, which is as follows:

Table 3: Seasonality of bamboo work amongst artisans

Activity	January	February	March	April	May	June	July	August	September	October	November	December
Engagement in Bamboo Craft	High					Low			High	Low		
Engagement in Agriculture	Limited					High			Low	High		

Source: Foundation for MSME Clusters' Research Work

Clusters and Artisans

Being predominantly a tribal state, Jharkhand has a rich history of tribal arts and crafts such as dhokra, terracotta, tribal jewellery, handloom / silk products and cane and bamboo. Given the vast tracts of forests in the state, bamboo is widely available and has been in use by the community for a range of purposes such as housing, food, fencing and household utilities amongst others. In general bamboo and bamboo products are universally available and used across the state.

In the absence of data from the government sources on the artisans that depend on bamboo craft for their livelihood, its challenging to assess the accurate number of artisans. However, according to some non-government sources such as Cluster Observatory set up by the Foundation for MSME Clusters (FMC) www.clusterobservatory.in, there are 20 cane and bamboo clusters in Jharkhand. Of these, eight have been mapped with select details as given in the following table:

Table 4: Key bamboo clusters in Jharkhand

Sl. no.	Name of the Cluster	District	Nos. of Artisan	Major Products	Expertise of the cluster
1	Hazaribagh & Barhi Cluster	Hazaribagh	500 + artisans	Multipurpose Holder, Table Lamp, File Folder, Pen holder, Container with Cover, Basket, bag, Wall Hanging	Mat & Basketry
2	Ghagara Cluster	Gumla	509 + Artisan	Basket, Flower Vase, Lamp table, Container, Charkha	Furniture, Mat & Basketry
3	Mandar & Angara Cluster	Ranchi	500 + artisan	Mat, Candle Stand, Flower Vase, Pen Stand, Door Partition, Fruit Basket, Dustbin, Mirror Stand, Tray	Furniture, Mat & Basketry
4	Loharadaga cluster	Loharadaga	137 + Artisan	School Bag, File Folder, Container, Hanging Container	Furniture, Mat & Basketry
5	Dumka & Masalia Cluster	Dumka	1000 + Artisans	Basket, Dalia, Santhali Tokri, storage bins	Basketry, Mat
6	Chakulia & Baharagora cluster	East-Singbhum	350 + Artisans	Chair, Sofa-set, Baby chair, containers	Furniture, Mat & Basketry

Source: Cluster Observatory, Foundation for MSME Cluster

Bamboo Cluster in Jharkhand - a case of Dumka

Dumka is amongst the largest bamboo cluster in Jharkhand specialising in utility products such as mats, baskets and winnowing trays (Supa). The cluster has traditional artisans following labour intensive production process as shown below. Their products have demand in the local market but are of low value. However the price and demand goes up during the festival and wedding season.

Production Process for Mats, Trays and Baskets



Figure 7: Production process for bamboo mats, baskets and trays

Bamboo and Economic Development

Given its prominence and relevance in the society and its culture, both rural and urban, bamboo is an excellent source of economic growth and development. World over and specifically in India, millions of household depend on bamboo for their income, food and utilities.

In India, 8.6 million people depend for their livelihoods on bamboo and bamboo industries. According to the Dalwai committee report on Doubling Farmer's Income, bamboo sector is heavily underutilised and has the potential to create more than 516 million man days of work every year.

Indian bamboo is currently estimated to create value equal to USD 4.4 billion – approximately 130 times the USD 34 million recorded in 2003. In China, the world's largest bamboo producer, production was valued at USD 19.5 billion in 2012 – an increase of nearly 50 per cent from the 13.1 billion recorded in 2010.

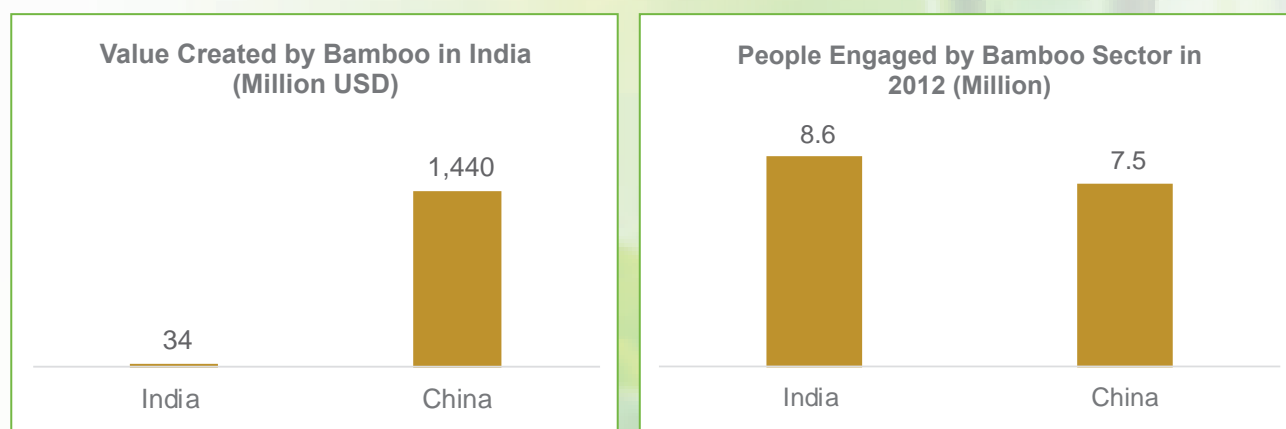


Figure 8: Value created, and people employed in bamboo sector

Data: INBAR, Bamboo Facts

According to International Bamboo and Rattan Organisation, the estimated worth of bamboo and rattan sector across the world is approx. USD 60 billion a year and its annual international trade is close to USD 2.5 billion.

India's Share in International Trade

Even though India is one of the leading producers of bamboo, its share in world market is negligible, accounting for less than 1% of the total global trade in 2017 (Data: UN Comtrade). Some of the leading exporters of bamboo products are China, Vietnam, Thailand and Indonesia.

Table 5: Bamboo trade statistics (India and China)

Trade Statistics of Key Bamboo Products in 2017 by Value (Rs. Crores)						
Commodity	India's Export	India's Import	World Export	Export Share of India	China's Exports	Share of China %
Bamboo Shoots	-	0.8	2,162	0.00%	524	78%
Bamboo used primarily for plaiting	1.8	200.8	673	0.26%	1,992	92%
Bamboo Charcoal	0.5	0.8	382	0.12%	255	67%

Bamboo Flooring	2.5	5.6	1,608	0.15%	1,489	93%
Bamboo Plywood	1.3	3.2	936	0.14%	710	76%
Bamboo Mats / Screens	0.5	3.6	597	0.08%	513	86%
Bamboo Plaits & Plaiting Materials	0.2	0.7	333	0.06%	304	91%
Bamboo Basketwork	1.3	5.9	1,709	0.08%	1,167	68%
Bamboo Pulp	0.1	8.8	22	0.45%	14	63%
Bamboo Paper Based Products	0.1	0	224	0.07%	84	38%
Total	8.3	230.3	8,646	0.10%	7,052	82%

Data: UN Comtrade

China has a dominant position in exports of bamboo products across all product categories, especially the bigger ones such as bamboo shoots, bamboo flooring and bamboo basketwork.

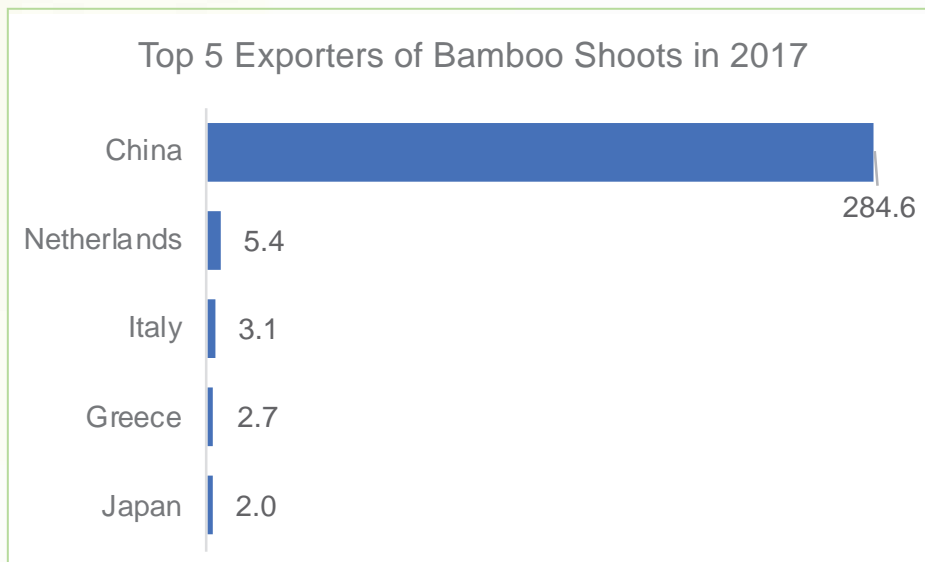


Figure 9: Leading exporters of bamboo shoots

Data: UN Comtrade

After China, some of the largest exporters of bamboo products are European countries such as Germany, Netherlands, United Kingdom, France and Italy. It is to be noted that these countries don't have a bamboo production base - they import bamboo as raw material, process it and export to others.

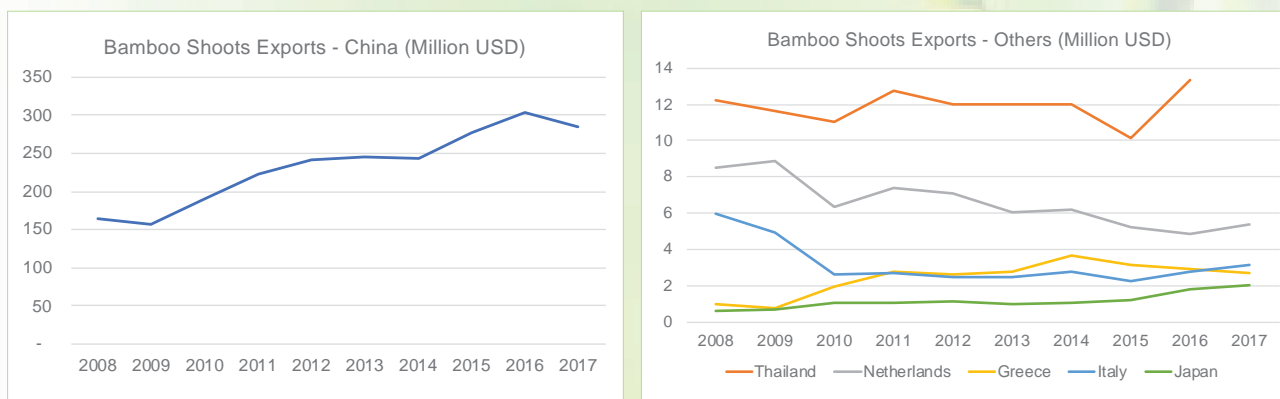


Figure 10: Exports trend in bamboo shoots

Data: UN Comtrade

This could be made possible by providing an enabling environment for entrepreneurship or in general enterprise development where entrepreneurship along with adequate policy support creates a competitive industry geared towards exports. Whereas, in case of India, despite being the leading consumer and producer of bamboo, we are often unable to competitively tap the market as in the case of incense sticks. India imported Rs. 546 Crores of incense sticks' (Agarbattis) by value in 2018, primarily from China and Vietnam. This primarily happened due to the reduction in import duties, due to which the imports grew exponentially from 31 Crores in 2008 to 546 Crores in 2018.

If adequate incentives and policy support is provided to the sector, these items can be gainfully produced in India creating employment and prosperity for tens of thousands of people. Thus, support for enterprise development is key to poverty alleviation and very often needs support from multiple stakeholders, including government, civil society and private sector.

Jharkhand's Share in Exports and National Markets

In the absence of information on the market size of bamboo products within Jharkhand and state's share in the national and international markets, it is difficult to assess state's contribution. However, given that the leading cane and bamboo clusters are in North-East India, it can be assumed that Jharkhand has so far not tapped national and international opportunities and its products primarily cater to the domestic market. This is also corroborated by the fact that most of bamboo products in the state are utility items such as mats, baskets and trays and are primarily oriented towards local and regional consumption.

Key Issues with Bamboo Sector

The key constraints and challenges faced by bamboo sector in Jharkhand is similar to the ones faced by artisans, entrepreneurs and producers in other parts of India as well. The major issues emerging from various studies are (i) lack of availability of uniform quality of raw material and accessibility for artisans & entrepreneurs; (ii) poor market linkages; (iii) lack of financial support (especially working capital); (iv) lack of harvesting technique and scientific treatment practices and; (v) absence of value added products.

Strength, Weakness, Opportunity, Threat (SWOT) Analysis

Table 6: SWOT Analysis

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> ➤ Skilled artisans and large artisan base with a rich history of making bamboo products (local market oriented though) ➤ A sound raw material base (though not uniform) providing access all through the year ➤ Demand for bamboo utility products in rural / local area ensuring consistent and regular demand for certain products 	<p style="text-align: center;">Weakness</p> <ul style="list-style-type: none"> ➤ Low adoption of technology and mechanisation and dependence on traditional methods ➤ Absence of modern management practices especially in quality standards ➤ Inability of the producers to assess the trending demand and preference in national and international markets ➤ Lack of interest amongst the financial institutions in financing bamboo sector ➤ Limited options for investment since large tract of land is not available as collateral ➤ Vulnerability of artisan and low risk taking capabilities
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> ➤ Growing demand for eco-friendly products in national and international markets ➤ Support from government programs and institutions at national and state level (such as National Bamboo Mission, Jharcraft and TRIFED) ➤ Efficiency gains from technology adoption leading to cluster level competitiveness ➤ Access to distant markets and emerging trends through ICT platforms ➤ Better management of bamboo production leading to greater access and affordability for artisans 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> ➤ Substitute products and cheaper alternatives such as plastics for the low income households which continue to use bamboo as utilities

Opportunities in Bamboo Sector

Creating meaningful livelihood opportunities from agriculture and allied sector such as bamboo cultivation and value addition has been the aim of several government, civil society, research institutions, multilateral institutions and private sector interventions.

In the “Report of the Committee on Doubling Farmers’ Income” by the committee headed by Dr. Ashok Dalwai, bamboo has been identified as an important source of income for farmers through enterprise development based on its various uses. It also generates opportunities from cultivation to value addition at the household level and opportunities for entrepreneurs to manufacture bamboo products at commercial level and at scale. Some of the opportunities identified in the report and by other experts and organisations include:

Housing and Construction

Housing is a major source of consumption of bamboo and continues to grow with the sector. Due to its strength and diversity in applications, apart from scaffolding, bamboo is used in flooring, door and window frames, roofing, composite boards and prefabricated houses. Several opportunities for pre-fabricated bamboo buildings and bamboo toilets are already demonstrated by at least a dozen public and non-governmental institutions. The National Building Code, 2005 provides room for usage of several species of bamboo. There also lies potential in public initiatives in housing (Pradhan Mantri Awas Programme), schools and toilets (Swachh Bharat Initiative). This will be a new area of Jharkhand based enterprises to venture into since there are few existing enterprises of this kind.

Boards and Panel

Bamboo has applications as particle board, floorboard, laminated board, pressed boards, compound board used at household and industrial levels. This will also be a new area for Jharkhand to tap into and help create enterprises in this capital intensive sector.

Food

Bamboo shoots are already a popular food in several Asian countries and are becoming popular globally. The sector has seen consistent growth in exports in last 10 years. In 2017, the total value of world exports was approx. 310 million USD or approx. Rs 2,200 Crores. Apart from the large domestic consumer base, India can benefit from the growing export market, where it is an insignificant player as of now. However, there are hardly any enterprises of this kind in Jharkhand and their development will involve creation of a proper ecosystem around it.

Crafts and Utilities

Craft and utilities are already a major source of consumption of bamboo and continue to find new opportunities through product development and orientation amongst the consumers towards eco-friendly alternatives to plastics. Partnership between Government of Jharkhand and IKEA to export bamboo products from the state is a case in point. Several more such partnerships with a wide range of institutions and private sector can help build on its existing strength in this sub-sector where Jharkhand is already strong.

9. Ministry of Agriculture, Government of India

Energy

Due to its fast growth, bamboo is considered a good source of renewable energy as charcoal and biomass. In 2017, more than Rs 382 Crores of charcoal were exported globally, of which two-thirds was exported by China. Other leading exporters were Namibia, Indonesia and Egypt. This is not a very capital intensive segment of bamboo sector and a lot of bamboo waste or unusable bamboo can be used for this. The level of technology required is also not very high.

Sanitary Applications

According to the report on doubling farmers' income, "bamboo fibre has natural effects of sterilization and bacteriostasis, and is therefore widely preferred for manufacturing sanitary materials such as sanitary towel, gauze mask, absorbent pads and food packing". This technology intensive segment will also require nurturing in Jharkhand since there are no existing enterprises to draw experience from.

Enterprise Development in Bamboo

To tap the opportunities in bamboo sector, it is important to create enterprises that can set up business and business models to grab the market potential and create jobs and economic benefits for the society and state. Entrepreneurs, both large and small, individual and institutional are key to the sustainability of the sector as they take risk and create opportunities for all.

In areas where not enough enterprises exist, there is a need to create more entrepreneurs and enterprises to strengthen the sector. For successful model of enterprise development, support from the other actors in the ecosystem is equally important. These actors include government agencies, programmes, producer networks, research institutions, business development service providers and training institutes amongst others. The below figures describes the “Ecosystem for Bamboo Enterprise Development” as per a model prepared by the Foundation for MSME Clusters (FMC) for their interventions in bamboo sector.

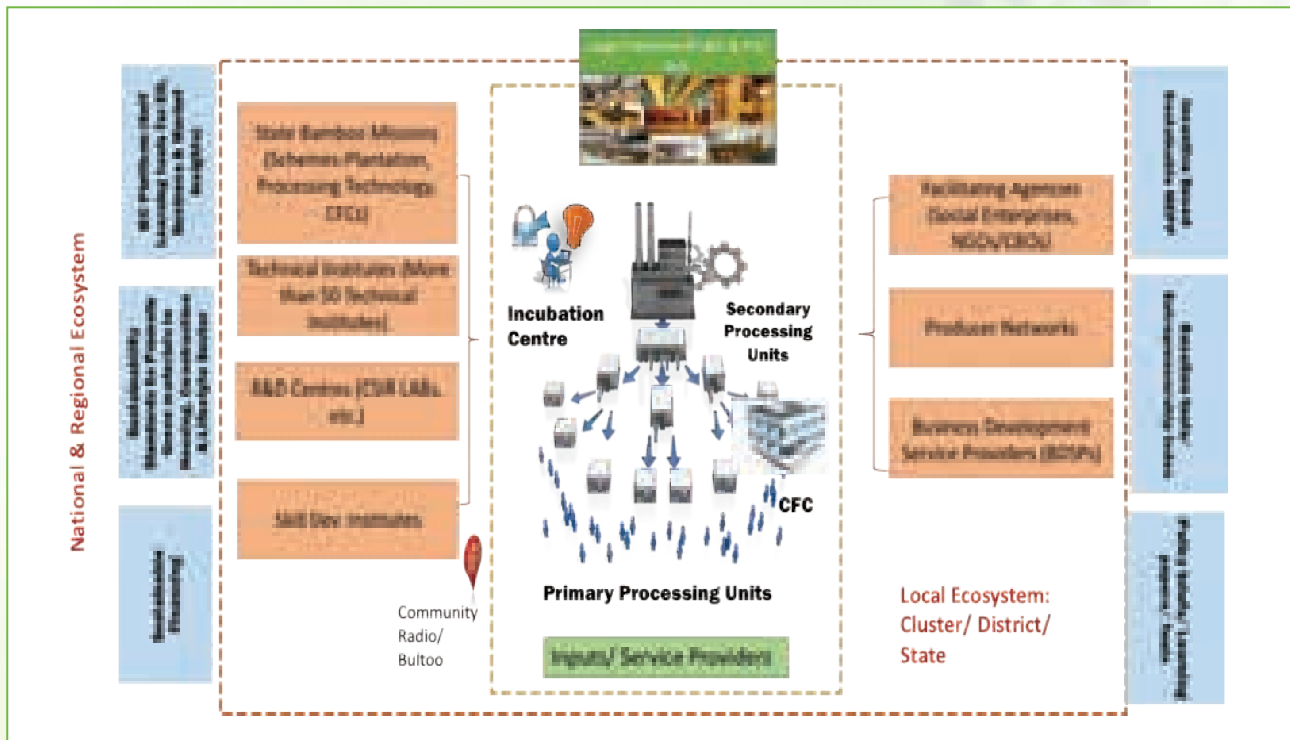


Figure 11: Ecosystem for bamboo enterprise development

Source: Foundation for MSME Clusters

Following this model, FMC has supported enterprises in a range of sectors and also in Jharkhand bamboo sector through a hub and spoke model, with Dumka as its hub. The details on some of the enterprise development ideas and opportunities in bamboo sector are shared in the next section of the report.

Enabling Institutions in Jharkhand

Bamboo sector is supported by several national and state level institutions on skill development, production, technology, infrastructure, marketing, enterprise promotion (MSME) and credit linkages amongst others. There are other important institutions and programs that provide indispensable support to the sector. Some of the key government programs are as follows:

Mukhyamantri Laghu Evam Kutir Udyam Vikas Board

The board works in the field of rural and urban entrepreneurship through strengthening of rural based economies of Jharkhand by "area resource specific, technical interventions, infrastructure development, capacity building, marketing linkups and promotion, credit linkage and hand holding". The Board in convergence with the State Bamboo Mission implements schemes under the National Bamboo Mission, Ministry of Agriculture and Farmers Welfare, Ministry of MSME, Ministry of Tribal Affairs etc.

Jharkhand State Bamboo Mission

As part of the a flagship programme of the Government of India for "adopting area-based, regionally differentiated strategy and to increase the area under bamboo cultivation and marketing" National Bamboo Mission implements its programme through 21 State Bamboo Missions. The Jharkhand State Bamboo Mission envisages promotion of holistic growth of bamboo sector by increasing bamboo cultivation in the state and taking suitable steps for strengthening the marketing of bamboo products.

JHARCRAFT

Jharkhand Silk Textile and Handicraft Development Corporation Ltd. is a state government entity formed with the objective of creating rural livelihood opportunities in crafts and allied sector. It supports the bamboo artisans through raw material sourcing, training, designs, production support and marketing the produce such as furniture, lifestyle products, jewellery and incense sticks. Jharcraft has two rural emporiums, five in urban areas of Jharkhand and eight across the major cities in India.

Jharkhand Government Tool Room

Jharkhand Government Tool Room in Dumka is the nodal technical institution for development of machines and tools in the bamboo sector in Jharkhand and it also works closely with Indo Danish Tool Room, Jamshedpur for technology development. This tool room provides technical and Tool support to incubators, CFCs and individual units in the bamboo sector. It is proposed to establish Bamboo Centre for Technology and Design in this Tool Room.

NABARD

An apex level development bank of Government of India aimed towards credit flow for promotion and development of agriculture, small-scale industries, cottage industries, handicrafts and other rural enterprises. NABARD supports bamboo farmers by enabling or providing credit support to them. NABARD is currently co-funding an integrated bamboo based enterprise development programme in Jharkhand supported by the SAARC Development Fund through the Foundation for MSME Clusters.

JSLPS

Jharkhand State Rural Livelihood Promotion Society is the state rural livelihood mission of Jharkhand started with an aim to “improve rural livelihood options and work towards social and economic empowerment of rural poor and women”. It works through the institutional structure of SHGs and their federation. Financial inclusion and enterprise promotion are one of the key works of JSLPS and the bamboo artisans could benefit from it, especially in capacity building and financial linkages.

Rural Self Employment Training Institutes (RSETI)

An initiative of Ministry of Rural Development, Government of India, they have dedicated infrastructure in each district to impart training and skill upgradation of rural youth geared towards entrepreneurship development. They are managed by banks with active co-operation from the central and state governments.

Private Institutions/ Organisations

Some of the private institutions, social enterprises and not for profit entities which are actively working for enterprise development in the state are as follows:

Foundation for MSME Clusters (FMC)

The Foundation for MSME Clusters (FMC) is a not-for-profit organisation known worldwide as a pioneer agency for the development of Micro Small and Medium Enterprises (MSMEs) with the help of cluster development approach. FMC has rich experience of working with MSMEs and has provided services in the areas of advocacy, implementation and coordination, training and research to more than 200 MSME clusters nationally and globally across 19 countries. FMC provides a broad range of project-based services to the MSMEs, their representative Industry Associations (IAs), Technical agencies, Financial institutions/ Banks and Government (both state level and national level) across various thematic areas of specialisation that include value chain development, productivity & competitiveness, energy efficiency, sustainable production and consumption, business development services (BDS), common infrastructure development and innovation. FMC has provided training and policy advisory services both nationally and internationally in MSME development and helped draft a number of schemes of assistance followed by training of policy makers & practitioners to then implement those schemes effectively. FMC is currently implementing two flagship projects supported by the European Union SWITCH Asia initiative and SAARC Development Fund and NABARD to promote bamboo as a sustainable resource and generate green jobs. FMC intends to help grounding of 350 MSMEs in Bamboo sector and enhance livelihoods of more than 1000 artisans/ farmers through these two initiatives respectively. Details of both the initiatives can be seen towards the end of this report.

Evangelical Social Action Forum (ESAF)

ESAF stands for sustainable holistic transformation of the poor and the marginalized for a just and fair society. It is registered charitable society, working in Bamboo sector for more than a decade. It is also working with the Foundation for MSME Clusters under the EU Switch Asia & SDF & NABARD co-funded bamboo initiative in Jharkhand.

Xavier Labour Relation Institute (XLRI), Jamshedpur

One of the leading management institute to encourage critical thinking and continuous improvement, inculcate culture of innovation and entrepreneurship. Social Initiative Group for Managerial Assistance (Sigma), a student society of XLRI, worked with Ambalika NGO to provide marketing support to 300 Sabar community of East-simbhum. Sigma conducted 2nd Social Entrepreneurship Conclave' on Feb 2019, in association with Tata Steel. Parichay, the first social venture of XLRI, which was launched last October-2016 to trade in tribal craft that has good utilisation value

Tata Steel Rural Development Services (TSRDS) Jamshedpur

TSRDS was established in 1979 to engage in various social development programmes in the rural areas within Tata Steel operates its business. TDRS conducted some skill enhancement training and market linkages partnership with the Kalamandir of jamsedpur.

Kalamandir, Jamshedpur

Kalamandir is a Non govt, Organization working to safeguard and promote the tribal/ folk traditions of Jharkhand. Biponi a unique initiative of Kalamandir was started in the year 2001. NABARD, Department of Industry, Welfare, Rural Development, NAEB it is now a full-fledged commercial hub Situated in Bistupur, Jamshedpur.

Jharkhand Education Centre (CED), Ranchi

CED is an institute for Socio-Educational Development & Research and it also promotes Art, Craft& Culture of Jharkhand Ranchi.

Society for Rural Industrialisation (SRI), Ranchi

SRI is a Voluntary organisation committed to tender scientific and technological support for rural development. SRI worked with the bamboo artisans of Ranchi and Hazaribag districts with the support of State govt. of Jharkhand.

A background image of bamboo stalks in a misty forest. The stalks are vertical and segmented, with some leaves visible. The mist is soft and white, creating a serene atmosphere. The overall color palette is light green and white.

Bamboo Product Profiles

Business Profile – Water Bottle

Bamboo Water Bottle

has immense potential as a substitute of plastics. They are eco-friendly, long-lasting and superior to plastic bottles as they can keep the water cooler for longer periods even in summers.



Production Process

Bamboo Species: Bambusa Balcooa

The bamboo bottles may be combined with components made of plastic or steel for value addition. However, demand for pure bamboo bottles is also high.

Investment and Returns

For an industrial set up to make bamboo bottles, the entrepreneur would need to invest around Rs. 25 Lakh including around Rs. 5 lakh working capital. The machines and components needed are treatment tank, drying chamber, lathe machine, sanding machine and portable cross cutting machine.



The bamboo is cut and treated naturally by boiling, drying and then smoking. Boiling purifies and strengthens the wall around the hollow of the culm.



The different parts of the bamboo bottle like the body, base, neck or cap are carved using lathe or turning machine. These parts are smoothed using sanding machine.



Optionally, the formed outer cup can be fitted with an inner liner. A glass filter or a stainless steel filter is placed inside the outer cup. The cap of the bottle may be made of plastic, metal or even bamboo.



Polish the bamboo body of bottle with waterproof oil polish or coating of camphor and mustard oil as needed. The cap can have round or threaded finishing.

Capital Investment	INR	Recurring Monthly Cost	INR
Construction for 1000 sq feet workshed	10,00,000	Salary for 10 workers @ Rs. 10000	1,00,000
Portable Cross cutting machine 3 Nos	60,000	Raw Material	1,50,000
Lathe Machine - 2 Nos	3,00,000	Electricity	50,000
Sanding Machine - 2 Nos	1,40,000	Insurance	2,000
Fabricated Drying Chamber 4ft x 4ft	3,00,000	Office Supplies	10,000
Fabricated Aluminium/MS Treatment Tank	2,00,000	Logistics	1,00,000
	20,00,000	Loan repayment 20 lakh loans @ 14% CI per annum	65,000
		Machine maintenance	20,000
			4,97,000
Turnover Calculation	INR	Profit Calculation	INR
Production per month	3,000	Gross Profit	30,36,000
Selling Price	250	Depreciation on machinery @20% considering 5 Year life	2,00,000
Total Turnover per month	7,50,000	Tax @ 30% on (Gross Profit-Depreciation)	8,50,800
Total annual turnover	90,00,000	Net Profit	19,85,200

Market

Bamboo based water bottles have seen a steady rise in demand in the national as well as the international market. DB Industries in Assam currently produces around 1,500 bottles per month and have standing demand of more than 8,000 water bottles per month.

Bamboo water bottles can be sold in retail and lifestyle stores such as Home Centre, Home Town and IKEA..

They are available on e-Commerce platforms such as Am zon and Flipkart. The product has good export potential to Europe, North America and Australia as the customer preference is aligned towards more sustainable and eco-friendly substitutes of plastics. Appreciation for such products is also growing in India, especially amongst the youth.

Apart from being utility products, use of such ecologically sustainable products is also seen as a style statement. This segment is driven mostly by social media - Facebook or Instagram. The sale and adoption of such products is highly dependent on references and recommendations. Thus, the entrepreneur needs to have access to markets in lifestyle retail chains, e-commerce and export market. Needs to be good at social media sales as well.

Business Profile – Bamboo Barbeque Skewers

Bamboo Barbeque Skewers

are popular with both vegetarian and non-vegetarian barbeque lovers across the world. Earlier iron skewers were used widely but is getting fast replaced by bamboo ones, creating a huge market potential in both domestic and exports markets. These are single use and affordable products having no negative impact on environment. Studies have shown that food contamination in bamboo skewers is much less than steel skewers.



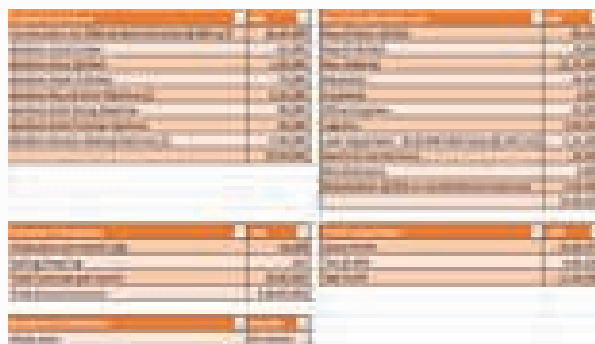
Production Process



The final product is packaged in bundles, packets, cartoons to reach buyers at different places.

Investment and Returns

For an industrial set up to make bamboo skewers, the entrepreneur would need to invest 55 - 60 lakhs depending on the planned scale of the business, including 20 - 25 lakhs for working capital. The machines and components needed are bamboo cross cutting machine, splitting machine, slicer machine, stick making machine, skewer making machine and polishing machine and boiling tub. One can easily produce toothpick and chopstick by the same production line by adjusting the machines or adding a single specific machine to the production line. Prashant Bamboo Machines, Arihant Engineering and Anil Enterprises are some of the suppliers of bamboo skewer machine. One can find machine suppliers from India and abroad on e-commerce portals such as India Mart and Alibaba.



Breakeven Point = 39 months

Market

The bamboo skewer market is growing rapidly due to its cost effectiveness in comparison to stainless steel skewers. As single use products, they are more preferred in picnics and marriage parties. The local markets include hotels, dhabas, motels and town side caterers. They can also be marketed through wholesalers and retail outlets. They are also popular on Amazon and Flipkart. One may register on B2B portals such as India Mart, Trade India and Alibaba for bulk orders across the country and globe.

Business Profile – Bamboo Straw

Bamboo Straw

requires Culms of Melocana baccifera, Bambusa pallida of 6-8mm or less diameter and 1-3 years of maturity. In Jharkhand state branches of Bambusa nutans or Bambusa tulda could be alternative raw material as M. baccifera and B. pallida are unavailable. Bamboo straws are natural, eco-friendly, biodegradable, hygienic and chemical free substitute of plastic straw. They are reusable if washed and dried properly. Machine and portable cross cutting machine.



Production Process



Investment and Returns

A bamboo straw unit of 1 Lakh pieces per month would need an investment of approx. Rs. 2.8 Lakhs and working capital of Rs. 2 Lakhs for 30-day cycle. Major equipment required are grinding and sanding blade, oven and straw cleaning brush.

Capital Investment	INR	Recurring Monthly Cost	INR
Construction for 400 sq ft bamboo work shed @ Rs.500 per sq ft	2,00,000	Payroll for 12 workers average @ Rs. 8000	96,000
Hand tools & other supporting equipment	20,000	Raw Material	90,000
Sanding machine	22,500	Electricity	3,000
Boiling equipment	10,000	Insurance	2,000
Electrical fittings & rack for work shed	20,000	Office Supplies	3,000
Total Investment	2,72,500	Logistics	5,000
Turnover Calculation	INR	Loan repayment - 2.72lakh loans @ 14% CI/annum	9,588
Production per month (pcs)	1,00,000	Machine maintenance	2,000
Selling Price	2.7	Depreciation SLM (Work shed 3.17% & Machine 6.33%)	810
Total Turnover per month	2,70,000		2,11,398
Total annual turnover	32,40,000	Profit Calculation	INR
		Gross Profit	7,03,224
Breakeven Calculation	Months	Tax @ 30%	2,10,967
Break even	7 months	Net Profit	4,92,257

Breakeven Point = 7 months

Market

Bamboo straw is the alternative option of plastic and paper straws and has high potential to grab a share of the existing straw market in India. It has an advantage over plastic as it is reusable and biodegradable. Government of India is set to impose a nationwide ban from 2nd October 2019 on six single use plastic items - plastic straw is one of them and can open up high demand for bamboo straws.

It would be in demand in restaurants, hotels, institutional canteens, corporate house staff canteens, juice bar, coastal area eateries, and eateries where consumers spend about 45

minutes to have beverages. Bamboo straws are better than paper straws as the latter cant withstand more than 5minutes when dipped in liquid. There is scope of selling few lacs of bamboo straw in a month through B2B sales.

E-commerce platforms viz. Amazon, Alibaba, Flipkart are already placing bamboo straws as part of their assortment. The product has significant export potential. In US 500 million straws are used on daily basis. US and European countries are shifting to sustainable environment friendly products and enquiring for single use plastic substitutes. The European Union plans to ban single use plastic straws by 2021.



Business Profile – Murha

Murha

also spelt as muda, moodha, muddha is a traditional handcrafted bamboo stool



Production Process

Preferred Species: Bambusa Tulda

	Frame of the Murha <ul style="list-style-type: none">Bamboo sticks measured and cut in uniform lengths.Pairs of bamboo sticks arranged opposite to each other in rows.Bamboo sticks then held up using planks, cane or bamboo frame.Bamboo sticks are added one by one to create a strip of bamboo.Strip is woven till desired length and rolled up to circular form.
	Base of the Murha <ul style="list-style-type: none">Bamboo sticks measured and cut in uniform lengths.Pairs of bamboo sticks arranged opposite to each other in rows.Bamboo sticks then held up using planks, cane or bamboo frame.Bamboo sticks are added one by one to create a strip of bamboo.Strip is woven till desired length and rolled up to circular form.
	Seat of the Murha <ul style="list-style-type: none">Interlocking ring used as thread to make seat uniform.Woolen strip or aluminium ring using cross, water, square, water thread or plastic to make the seat.Final weaving followed by diagonal weaving to make cross-hatch pattern.

Business Profile – Office Utility Products (Woven)

Office Utility Products

can be made out of various types of bamboo. It being a woody grass, with strong fibre is one of the best natural materials for making mats and baskets. As green substitutes, there is increasing demand for bamboo-based office utility products such as Paper bins, Files, Folders, Pen-stand etc. Suitable species are Bambusa nutans/ Bambusa tulda.



Production Process



Green bamboo of 1-2 years is ideal for making the mats and baskets. Ones with large internode length (i.e. Bambusa Tulda/ Nutan) provides better results



Removal of branches from the main culm and cross cutting of the culm to desired lengths can be done manually or using crosscut machine



Splitting of bamboo-culms to make strips and slivering to desired thickness and length can be done machine or using slivering machine



Coloring of bamboo slivers and strips is done manually with hot water and dye in steel or aluminium container



Weaving of mats and baskets by different interlacing and coiling techniques is done manually by the artisans

Investment and Returns

For an industrial set up to make Bamboo Office Utility Products, investment of 6.5 to 8.5 Lakhs (including 2.5 - 3.5 lakh working capital) is needed depending on the scale of business. The machines could be availed vendors such as Anil Enterprises in Dewas (MP).

A)	FIXED CAPITAL	
I.	Land & Building	
	1	Work-Shed (60 ft X 80 ft) Bamboo Frame & GC Sheet
		1,50,000
II.	Machineries and Equipment	
	1	Crosscut Machine, 1 HP
		25,000
	2	Radial Splitter Machine 5HP
		1,80,000
	3	External knot removal Machine, 1 HP
		30,000
	4	Heavy Duty Sliver Machine, 1.5 HP
		62,000
	5	Thin Sliver Machine 1 HP
		38,000
	6	Heavy duty stitching Machine (JUKI)
		20,000
	7	Spare & Maintenance kit
		20,000
	Total	
		3,75,000
	Total Fixed Capital Requirement:	
	I.	Land & Building
		1,50,000
	II.	Machineries and Equipment
		3,75,000
	Total	
		5,25,000
B)	Working Capital (Per Month):	
I.	Staff & Labour (Per Month)	
		32,650
II.	Raw -material (Per Month)	
		55,950
III.	Utilities (Per Month)	
		4,200
IV.	Other Contingent Expenses (Per Month)	
		8,000
IV	Total Recurring Expenses (per month)	
		1,00,800
	Total Working Capital for 3 - months	
		3,02,400
C)	Total Capital Investment	
	Fixed Capital	
		5,25,000
	Working Capital for 3 - months	
		3,02,400
	Total Capital	
		8,27,400
D)	Financial Analysis:	
I.	Recurring Expenses/ Annum	
		13,52,060
II.	Turnover / Annum	
		21,65,000
III.	Net-Profit /Annum	
		8,12,940
IV	Net Profit Ratio /Annum	
		37.55%
V.	Rate of Return:	
		98.25%
VI	Break Even Point:	
		14.16%

Market

Due to its environment friendly benefits, overall demand for bamboo products is increasing. Government offices, such as Forest and Environment departments are deciding to use bamboo-based office utility products. Students are also showing preferences towards such products and in general people are becoming aware and prefer green bamboo products than non-biodegradable products. This leads towards a large market potential for bamboo-based office utility products like paper bins, file, folders pen-stand, pencil box etc. and more options likely to emerge in future.

Business Profile – Round Bamboo Furniture

Round Bamboo Furniture

or the traditional bamboo furniture are seen as low-cost substitute to wooden furniture. The aesthetically designed ones have found a resurgence in demand in interior decoration, use in gazebos, resorts and lawns. They can outlast wooden furniture and fetch good price in the market, making it a lucrative business.



Production Process

Solid bamboo species like *Dendrocalamus Strictus* and *Dendrocalamus stocksii* are most suitable for making furniture. *Bambusa Tulda* with *Dendrocalamus giganteus* and *Bambusa pallida* is often used in Assam. In Tripura, *T.Oliveri* is used.

The final product is then polished using air sprayer with compressor and packaged with cardboard, bubble wrap. The machinery can be procured from both Indian as well as Chinese manufacturers. Portable cross cutting machines are available at Bosch or Stanley



The bamboo selected for making the furniture should be of at least 3 years maturity. Lesser hollow ones provide better results



The bamboo is treated with preservatives to enhance its pest resistance and longevity. Preferred method is CCB Treatment (Boric-Borax)



The bamboo is then straightened by application of heat. Usually, LPG Blow torch is used for the purpose. For bending the bamboo, straightening wooden column is used



The components required for assembly of the bamboo furniture are made by knot removing, marking, filling end parts and groove making. The tools needed are measuring tape, saw, pencils, scraping knife, knot removal hand planer or angle grinder or knot removing machine



The joineries are made with the help of marking jig, tape, markers, saw, chisel and hammer. The components are then assembled to make the final product using Long Clamps (F Type), C-Clamps, Hammer, Adhesive / Glue, Chisel, Hand / Electrical Drill

Investment and Returns

Investment of Rs. 10 - 25 Lakhs including Rs. 5 - 6 lakh for working capital is required. Machines needed are pressure treatment plant, LPG blow torch with accessories, straightening wooden column, angle grinder or knot removing machine and portable cross cutting machine.

Capital Investment		Recurring Monthly Cost	
Construction for 2000 sq feet workshop	50,00,000	Fixed Labour & Fees at Rs.10000	60,000
Vacuum Treatment Plant	7,00,000	Owner's Salary	25,000
LPG Blow torch and accessories	2,000	Supervisor's salary	15,000
Straightening wooden column	2,25,000	Raw Material	1,50,000
Angle grinder/knot removing machine	50,000	Electricity	50,000
Air sprayer with compressor	1,000	Insurance	2,000
Portable cross cutting machine	50,000	Office Supplies	10,000
	20,00,000	Logistics	1,00,000
		Loan repayment - 20 lakh loan @ 10% CI/annum	14,000
		Machine maintenance	50,000
		Miscellaneous (Cylinders, welding paper, etc)	1,000
			4,38,000

Business Calculation		Profit Calculation	
Production per month (sets)	25	EBITDA	7,17,000
Selling Price	22,000	Depreciation of machinery @ 15%	1,50,000
Total Turnover per month	5,50,000	Depreciation of Workshop @ 10%	1,00,000
Total annual turnover	66,00,000	Tax @ 30% on net Profit	1,44,000
		Profit after Tax	5,17,000

Breakeven Point = 33 months

Market

In 2006, the furniture market of India was estimated at Rs. 35,000 crores. Considering that with the emergence of growth factors like (i) product innovations; (ii) organized retail showrooms (IKEA, Home Town, Home Centre etc.); (iii) advent of e-commerce like Pepper Fry, Urban Ladder, etc. and; (iv) organized furniture rental providers such as Furlenco and Rentomojo; the markets have transformed and grown bigger. Around 15 % of the market is in the organized sector, catered by companies such as Godrej & Boyce Manufacturing Co. Ltd., BP Ergo, Featherlite, Zuari, etc.

To meet emerging demand in national and exports market, the entrepreneur will need to develop knock-down or DIY versions of the products for easier storage, packaging and transportation. Those would require different designs, accessories and production systems. According investments in business may vary.

Business Profile – Toothpick

Bamboo Toothpick

is preferred against wood as a raw material for the product due to fast growth of bamboo and easy availability.



Production Process

Raw bamboo is crosscut into sizes for splitting using manual or electric splitter. The splits are then put into a knot removing machine remove the interior knots in the upper green part of the bamboo. The strips are then sliced based on dimensional requirement of the final product and then boiled in hot water to enhance its durability. They are made into sticks using round stick making machine and then cut into sizes, polished and sharpened with machine. The stick may be sharpened from one or both sides depending on the requirement.

Investment and Returns

To set up a full-fledged semi-automatic or fully automatic bamboo toothpick making production line, 7 basic machines are required. These can be procured form suppliers from India, Vietnam or China. Prasant Bamboo

Machines and Anil Enterprises are few suppliers in India.

The likely capital investment for the production line shall be around 45-50 lakhs depending on the scale of production, excluding working capital for one month of around 20 lakhs. The same production line can be used for making products such as bamboo skewers and chopsticks by adding machines needed to make them. The estimates of the investment and expected returns are as given below:

Breakeven Point = 21 months

Market

Bamboo toothpick is one of a hot selling bamboo product in domestic and international markets with a stable and increasing demand. Food points, restaurants, hotels have a regular bulk demand for the product. To reach more bulk buyers across the nation and globe the unit may be registered under different B2B online platform like India Mart, Go for Global, Trade India and Exporters India. For retailing, online platform like Flipkart, Amazon, Paytm, Nature Baskets, Grofers can be very useful. Offline sales promotion can be done to create a regular business channel in local and intra-state market. Social networking sites like

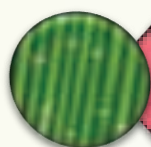
Business Profile – Contemporary Basketry Products

Contemporary Basketry Products

can be made out of bamboo which are in high demand as packaging substitutes. In Dumka Bamboo Cluster of Jharkhand Bambusa nutans or Bambusa tulda are ideal to make products like storage bins, fruit / packaging baskets etc.



Production Process



Green bamboo of 1-2 years is ideal for making mats and baskets. Bamboo with large internode lengths (i.e. Bambusa Tulda/ Nutan) provides better results.



Removal of branches from the main culm and cross cutting of the Bamboo-culm to desired lengths, can be done manually or with a cosscut machine



Splitting of bamboo culms to form strips and slivers of desired thickness and length is done with a slivering machine in an industrial set up



Coloring of bamboo slivers and strips is done manually with hot water and dye in steel / aluminium container.



Weaving of mats and baskets by different interlacing and coiling techniques done manually by the artisans.

Investment and Returns

An industrial set up to make basketry packaging items, would need investment of 6-7.5 Lakhs

(including around 3-3.5 Lakhs for working capital) depending on the planned scale of his business. The machines and components required can be obtained from vendors such as Anil Enterprise in Dewas (MP).

(A) FIXED CAPITAL		
I. Land & Building		
1	Work-Shed (60 ft X 50 ft) Bamboo Frame & GC Sheet	90,000
II. Machineries and Equipments		
1	Crosscut Machine, 1 HP	25,000
2	Radial Splitter Machine 5HP	1,80,000
3	External knot removal Machine, 1 HP	38,000
4	Heavy Duty Sliver Machine, 1.5 HP	62,000
5	Thin Sliver Machine 1 HP	38,000
7	Spare & Maintenance kit	20,000
Total		3,63,000
Total Fixed Capital Requirement:		
I.	Land & Building	90,000
II.	Machineries and Equipments	3,63,000
Total		4,53,000

(B) Working Capital (Per Month):		
I.	Staff & Labour (Per Month)	27,650
II.	Raw-material (Per Month)	58,750
III.	Utilities (Per Month)	3,980
IV.	Other Contingent Expenses (Per Month)	8,000
	Total Recurring Expenses (per month)	98,380
	Total Working Capital for 3-months	2,95,140
(C) Total Capital Investment		
	Fixed Capital	4,53,000
	Working Capital for 3 months	2,95,140
	Total Capital	7,48,140
(D) Financial Analysis:		
I.	Recurring Expenses/ Annum	13,06,117
II.	Turnover / Annum	19,15,000
III.	Net-Profit /Annum	6,08,883
IV.	Net Profit Ratio /Annum	31.80%
V.	Rate of Return:	81.39%
VI.	Break Even Point:	16.32%

Market

Using bamboo instead of plastic helps significantly reduce our carbon footprint and creates market opportunity. In terms of uses, it is already playing a leading role addressing the needs of basketry and packaging solutions and other utility items with more options likely to emerge in future.

Business Profile – Bamboo Shoots

Bamboo Shoots

Bamboo Shoots are the young, edible bamboo plants, generally 20-30 cms long, tapering at one end. They are consumed as food items after harvesting and form a traditional delicacy of many countries such as China, Japan, Thailand, Bhutan, Korea and India (particularly Eastern and North East India).

Bamboo shoots have high nutritional values - are low in cholesterol and saturated fats (total fats



0.5%), and high in carbohydrate (5.7%), protein (3.9%), minerals (1.1%) and moisture (88.8%). With 17 types of Amino acids, it contains 10 types of mineral elements – Co, Cr, Zn, Mn, Mg, Ni, Co, Cu etc.

Production Process

Receipt of freshly harvested bamboo shoots → Washing in Chlorinated Water → Removal of Culm Sheath and Peeling → Cutting to the desired size in the form of slices or dices → Blanching in boiling water (5 - 6 times) with dose of fresh water for each wash → Cooling by immersion in water at room temperature → Dewatering using sieves → Weighment in 250 gms, 500 gms and 1 kg → Filling in 3 layer HDPE bags of 80 micron thickness → Vacuum Sealing → Packing in Corrugated Boxes.

Investments and Returns

CAPITAL INVESTMENT	INR	WORKIN CAPITAL - ONE SEASON - 60 DAYS	INR
Construction for 700 sq. feet workshed	7,10,000	Hired Labour Skilled and unskilled	6,00,000
Stainless Steel Preparation Table	46,000	Raw Materials	72,00,000
Stainless Steel Blanching Tank with cage and LPG Stove arrangement	1,92,000	Packing Cost	9,00,000
Double Chamber Vacuum Packaging Machine	8,43,000	Electricity and Power	58,000
Cutting and Dressing Tools	2,31,000	Freight	4,50,000
Personal Protective Equipment	30,000	Selling & Distribution Ex	2,25,000
Miscellaneous Fixed Assets	82,000	Interest on loan	1,50,000
Pre-Operative Expenses	72,000	Office Supplies	60,000
	22,06,000		96,43,000
		PROFIT CALCULATIONS	
		EBDTA	38,57,000
TURNOVER CALCULATIONS		Depreciation on Machinery @ 15 %	1,70,000
Production Per Season	90 Tons	Depreciation on Workshed @ 10 %	71000
Selling Price (in Rs. per ton)	1,50,000	Tax @ 30% on net Profit	10,85,000
Total Annual Turnover (in Rs.)	1,35,00,000	Profit after Tax	25,31,000

Break-even point: 36 to 40% of the production capacity. Internal Rate of Return: 18 to 22%.

- The project is conceived for single shift basis of 8 hours / day and 60 working days in one shooting season.
- Raw and freshly harvested bamboo shoot requirement is 2 tonnes per day. Bamboo Shooting Season is assumed at 60 days in a year. Price of fresh bamboo shoots is considered at Rs 60 / kg.
- Finished and packed bamboo shoots production is 3 tonnes per day, 90 tonnes of annual production and sales in 1 year.
- 8 LPG commercial gas cylinders are required in a month.
- Selling price is assumed at Rs 120 to Rs 130 per kg.
- Shelf life of the vacuum packed bamboo shoots is 90 days.

Market

Bamboo Shoots whether processed or raw have a good demand for its nutritional value but are not readily available in the metros, Tier 1 and Tier 2 cities. There are hardly any organized bamboo shoots processing facility in India to address the needs and standards of global markets.

Vacuum Packed Bamboo Shoots can be sold in the vegetable markets as well in local grocery stores and departmental stores for household use. Marketing network needs to be developed through distributors and retailers. The Chinese and Thai restaurants require good quality bamboo shoots and sourcing for these institutions is difficult during non-shooting season. These establishments can be tapped for bulk marketing of vacuum-packed bamboo shoots.

Business Profile – Bamboo Toothbrush

Bamboo Toothbrush

Bamboo handle-based toothbrushes can reduce plastic pollution caused by plastic toothbrushes. They are already in use in Sweden, USA and China due to natural, eco-friendly, biodegradable handle.



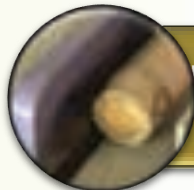
Production Process



The bamboo should be of 1-3 years maturity and inner wall thickness should be more than 6-7mm. *B. balcooa*, *D. Hamiltonii* could be used and sourced from forest or homestead plantation.



The bamboos are kept for drying at least 4-5 days to reduce moisture. After drying, bamboo is cross cut and split into long pieces width 20 mm using cross cutting and splitting machine.



Upper green layer and inner white layer with external and internal knot are removed using knot removing width sizing machine. Then long split is cut into 80 mm pieces for toothbrush handle.



Now the 80mm x 20mm x 7mm rectangle bamboo pieces are shaped as required and polished using sanding machine. Core is made on the shaped bamboo handle for tufting bristle. Carbonization of handles is done to prevent microbial growth and make it water resistant.



Tufting of the bristle is done. The bamboo toothbrush is now ready for laser etching. Brand name is etched on the lower flat part of the handle. The product is then packed and sold.

Investment and Returns

Bamboo toothbrush handle making unit needs capital investment of 25-30L with working capital provision of 5-7L. Machines for making bamboo handle are available in India. This industry requires

mainly semi-skilled workforce. 3 phase power supply, proper work shed, wide metaled road are minimum basic facilities required to establish the unit. The estimates of the investment and expected returns are as given below

Capital Investment for Handle Making unit	INR	Recurring Monthly Cost	INR
Construction for 1000 sq ft bamboo work shed @ Rs. 500 per sq ft	500,000	Salary for 10 workers (non-technical)	100,000.00
Bamboo Cross Cutter M/C	50,000	Salary for 2 technical persons / Machine Supervisor	50,000.00
Auto Splitter Machine 5HP	225,000	Raw Material	30,000.00
Internal knot removing and slicing Machine	141,000	Electricity	10,000.00
Sliver making machine	85,000	Insurance	5,000.00
External knot remove machine	57,000	Office Supplies	7,000.00
Two-side planner machine	295,000	Logistics	20,000.00
Bamboo Sizing machine	57,000	Loan repayment - 22.37 lakh loans @ 14% CI/annum	71,786.00
Sanding machine	27,000	Machine maintenance	20,000.00
Carbonization system	500,000	Depreciation SLM (Work shed 3.17% & Machine 6.33%)	10,483.00
Electric connection and fittings	300,000	Total	324,269
Total	2,237,000	Profit Calculation	INR
Turnover Calculation	INR	Gross Profit	15,08,772
Production per month (pcs)	75,000	Tax @ 30%	4,52,632
Selling Price	6	Net Profit	10,56,140
Total Turnover per month	450,000	Break even	Months
Total annual turnover	54,00,000	Break even	26 months

Market

Bamboo toothbrushes are already in use in India, though at very low scale due to lack of awareness and price. Their uniqueness lies in the raw material itself and after its use. Plastic production from petrochemicals is polluting the environment, whereas bamboo absorbs CO₂ and releases 35% more O₂ in the environment. Plastic brushes are non-degradable (even in 100 years) and source of 2nd largest plastic waste materials worldwide, whereas bamboo toothbrushes degrade in few years.

In India 150 million plastic toothbrushes are thrown to garbage every month. In India, the current monthly demand for bamboo toothbrush handles is around 1 Lakh pieces. It indicates changing practice and increasing use of bamboo toothbrushes. Rs. 6 per bamboo toothbrush handle will reduce cost of the final product and will encourage and appeal to more people to use them.

Humble Brush, Earth's Daughter, Bmbu, Modest planet, Wowe are few existing brands selling bamboo toothbrush internationally through e-commerce platforms viz. Amazon, Alibaba, Flipkart etc. Toothbrushes are sold single piece and family pack.

Business Profile – Bamboo Cutlery, Glass & Cup

Bamboo Cutlery, Glass & Cups

are products made from the bamboo stem.

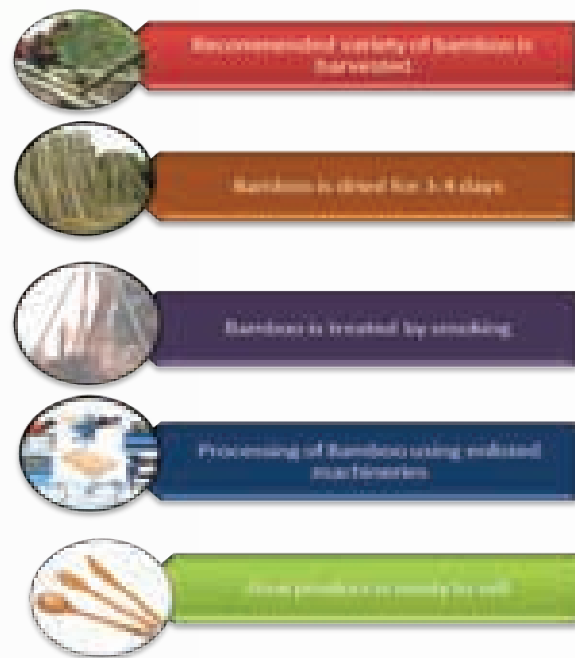


Production Process

Bamboosa Tulda, Bamboosa Nutans, Dendrocalamus Strictus, Dendrocalamus hamiltonii, Bamboosa Balcooa can be used for making such products. The various machineries that can be used for making cutlery and Glasses are listed as follows-

Certifications from agencies such as ISO, FSSAI and SGS laboratories are required.

Following is the specification of products, sub products and making process:



SI	Name of Machine	Products
1	Raw Bamboo Sawing machine 2.2 KW	Common for all products.
2	Bamboo Splitting Machine 3 KW-6	Common for all products.
3	Fixed Width Slicer 10.6 KW	Common for all products.
4	Bamboo Wool Slicer 9.6 KW	Common for all products.
5	Stick Cutting Machine 1.5 KW	Chopstick.
6	**Bamboo Spoon Shape Milling Machine	Spoon, Fork
7	**Further Shaping Forming Machine	Spoon, Fork
8	**Spoon Backside Planning Machine	Spoon, Fork
9	Medium Type Blade Sharpening Machine 0.75 KW	Common for all products.
10	Cordless Drill/Driver	Common for all products.
11	Hand Grinder 650 W 8500 Rpm	Common for all products.
12	Hand Tool Kit	Common for all products.

SI	Name of Product	Sub Products	Specification	Making process
				Manual/ Mechanical
1	Bamboo liquid Container	Bamboo Glasses	Height: 6-7 inches. Dia , 6-9 CM	Only cross cutting by machine rest is manual.
		Bamboo Cups	Height: 3-4 Inches. Dia: 6-9 CM	Only cross cutting by machine rest is manual.
2	Bamboo Cutlery	Bamboo Spoons	Length 5-8 Inches. Thickness 5-7 mm	All Mechanical.
		Bamboo Forks	Length 5-8 Inches. Thickness 5-7 mm	70-80% mechanical.
		Bamboo Knife	Length 5-8 Inches. Thickness 5-7 mm	All Mechanical
		Bamboo Chopsticks	4-10 Inch.	All Mechanical.

Investment and Returns

Total project cost is INR 36,48,244. The Investment for machinery and fixed capital is INR 35,07,934. The working capital requirement is INR 1,40,310. Total turnover of cutlery is projected at INR 32.5 lakhs. The turnover of Glasses and cups is projected at INR 20 lakhs. (Assuming prices 110 and 70 respectively).

Parameter	Value
Production Capacity	Cutlery 6,50,000 pieces, Glasses: 15,000, Cups 5000 in a year.
Area required	2,000 Sq. feet
Plant and Machinery Cost	INR 19 Lakh Approx.
Working Capital time	Per cycle 26 days
Cost of Project	36,48,244 approx.
Current ratio	0.43
Break Even Sales value in 1 st Year	INR 9,16,985
Net Profit (In Yr. 1)	INR 2,116,836 approx.

Market

Recently the Airport Authority of India, fast food giants like KFC's, McDonald's have decided to cease usage of plastic disposables and opt for biodegradable cutleries. In disposable cutleries, spoons accounts for 55% of global market, which is around USD 881 million (Source: Future market insight). The retail sales channel of disposable cutleries primarily targets social gatherings such as marriages, social club meetings and community get-togethers, etc. Institutional buyers include restaurants, event management companies, ice cream companies, temples and government and private canteens across the country. Online portals like India Mart, Amazon, Snap deal etc. can also be explored.

Business Profile – Strip Board

Bamboo Strip Board

Bamboo Strip Board is a decorative solid hard wood substitute for indoor use. It comes in sizes up to 8 feet length, 4 feet width and thicknesses ranging from 10mm to 18mm. It is suitable for indoor use for wall cladding, flooring, kitchenware and bath ware.



---.Sorting and grading of bamboo according to wall thickness and outer diameter is essential for good quality Bamboo Strip Board



--At the time of harvest only mature bamboos of 3 years age and above should be selected so as to ensure quality of the Bamboo Strip Board-



---Bamboo Strip Board can be sanded and moulded similar to other hardwood species such as teak. The natural grains on the surface have a unique attractive appearance.



--The Bamboo Strip Board should be protected from water and damp areas to avoid swelling and shrinkage.

Production Process

Cross Cutting → of Bamboo Poles → Splitting → Width Sizing, Inside knot removing, Outside Knot removing and slicing for making strips → Carbonization of Bamboo strips → Drying → Precise 4 Side Planning → Gluing of Bamboo Strips (Urea Formaldehyde Glue) → Pressing of Glued Bamboo Strips into Bamboo board using hot press → Thickness planning of Bamboo Board → Sanding of Bamboo Board → Edge milling, molding as per product requirement → Assembly of Bamboo Products → Plastic Shrink packing of Bamboo Products → Corrugated Box Packing → Dispatch to customers

Investment and Returns

The Project is based on single shift basis and 300 working days in a year. Needs 58 Workers and 10 administrative staff. The financial details are as follows:

INVESTMENT DETAILS	INR	RECURRING MONTHLY COST	INR
Workshed of 21,000 Square Feet.	3,05,63,000	Hired Labour Skilled and unskilled	6,50,000
Plant & machinery	4,65,59,000	Administrative Staff Salary	4,00,000
Miscellaneous fixed assets	1,28,00,000	Raw Materials	37,50,000
Pre-liminary & pre-operative exp.	20,00,000	Packing Cost	2,50,000
Contingencies	45,86,000	Electricity and Power	3,00,000
Margin money for working capital	23,24,000	Consumables	1,50,000
	9,88,32,000	Interest on loan	4,80,000
		Loan Repayment	9,50,000
		Office Supplies	1,00,000
			70,30,000
PROFIT CALCULATIONS			
EBDTA	2,81,40,000		
Depreciation on Machinery @ 15 %	69,84,000	TURNOVER CALCULATIONS	
Depreciation on Workshed @ 10 %	30,55,000	Production Per Month of Furniture, Bath ware, Kitchen ware	1500 CBM
Tax @ 30% on net Profit	54,30,000	Total turnover Per Month	93,75,000
Profit after Tax	1,26,71,000	Annual Turnover	11,25,00,000

- Break Even Point: 52-55%.
- Internal Rate of Return: 18-20%.

Market

Strip Bamboo Board has a unique soothing appearance and it can be colored to match the design interiors.

It is learned that one of the airports in India has recently floated a large tender for bamboo board products. Below is the image of application of bamboo boards at Madrid airport in Spain.

More products such as bowls and chopping

boards can also be made. These products are available at home furnishing stores, regular distributor and dealer network, e-commerce platforms and online furniture companies such as Urban Ladder and Pepperfry.



Business Profile – Agarbatti

Agarbattis

are one of the major applications of bamboo sticks followed by use as kulfi sticks, barbeque skewers and toothpicks. Agarbattis are used by a large population of India for praying purpose and for fragrance on a daily basis in most of the households and a large number of commercial establishments.



Production Process

Cross Cutting → of Bamboo Poles → Splitting → Width Sizing, inside knot removing, Outside Knot removing and slicing for making strips → Round Stick Making → Sizing of sticks → Sorting of sticks → Polishing of sticks → Packaging of sticks



Sorting and Grading of bamboo according to wall thickness and outer diameter is essential for good quality round bamboo sticks



At the time of harvest only mature bamboos of 3 years age and above should be selected so as to ensure quality of the round bamboo sticks



The round bamboo and the finished round bamboo sticks should be stored in dry area away from dampness in order to avoid fungal infection and borar attack



The profile cutters and the round saw should be sharpened at regular intervals in order to maintain the quality of round bamboo sticks

Investment and Returns

Some key assumptions for the project are as follows:

1. The Project is based on a single shift basis and 300 working days in a year.
2. Raw Bamboo Required is 5.34 Tonnes Per day
3. Finished Round Stick Yield is 15% / Day based

on average of 1.3mm, 2mm and 2.5mm diameter.

4. Bamboo waste shall be pulverized into fine dust and used as ingredient for agarbattis.
5. Manpower Requirement for the project is 30 workers and 2 administrative staff.
6. Power rate is assumed at Rs. 7 per KWH.

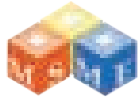
INVESTMENT DETAILS	INR	RECURRING MONTHLY COST	INR
Workshed of 5000 square feet	50,00,000	Hired Labour Skilled and unskilled	3,50,000
Plant & machinery	79,80,000	Administrative Staff Salary	1,00,000
Pre-liminary & pre-operative exp.	2,00,000	Raw Materials	6,75,000
Miscellaneous fixed assets	11,50,000	Packing Cost	2,40,000
Margin money for working capital	16,00,000	Electricity and Power	2,50,000
	1,59,30,000	Consumables	1,15,000
TURNOVER CALCULATIONS	INR	Selling & Distribution Ex	50,000
Production Per Month (Round Sticks)	20 Tons	Office Supplies	25,000
Production Per Month (Fine Bamboo Dust)	100 Tons		18,05,000
Selling Price Round Sticks (Per Ton)	95,000	PROFIT CALCULATIONS	INR
Selling Price Fine Bamboo Dust (Per Ton)	8,000	EBDTA	1,07,04,000
Total turnover Per Month	27,00,000	Depreciation on Machinery @ 15 %	13,70,000
Total Annual Turnover	3,24,00,000	Depreciation on Workshed @ 10 %	5,00,000
		Tax @ 30% on net Profit	26,00,000
		Profit after Tax	62,30,000

- Break Even Point: 52-55%
- Internal Rate of Return: 22-24%

Market Potential

The domestic production of Raw Agarbatti in India is about 1,20,000 tons per annum which requires 40,000 tons of Round Bamboo Sticks. Most of this quantity is imported from China, however the recent announcement of hike in customs duty from 10% to 30% has opened up opportunities for the domestic industry.

Further about 1,10,000 tons of raw Agarbatti is imported from Vietnam. Recently the Government has put raw Agarbatti in the restricted list which will reduce the quantum of imports and corresponding the demand for round bamboo sticks shall go up for these segments of Agarbatti.



Foundation For MSME Clusters

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PROJECT MANAGER: SANGEETA AGASTY



- More than 5 million people, half of them being women in the tribal regions across 18 states out of the 29 states of India where abundant quantity of bamboo is available as a resource for their livelihoods.
- However in the bamboo processing and product manufacturing segment, the number is likely to be around 3 million only
- While this bamboo resource has been augmented by a range of public initiatives but not sufficiently harnessed in terms of its market applications
- There is a huge scope for replacement of less sustainable resources and for creation of green jobs by effectively harnessing bamboo by upgrading existing products and introducing new products duly linked with markets
- For this FMC with its Partners has designed a customised, coordinated and converged local action that integrates a package of inputs through a strong self-sustainable local eco-system under the SWITCH ASIA Umbrella and implementing the project in 9 states in India



Expected Outcomes

1. 2250 MSMEs of which 40% are women owned, start/expand bamboo product supply worth 25.3 million Euros to existing/new markets, impacting 10,000 livelihoods (more than 50% women) through new income to the tune of 13 million Euros
2. Improved OHS and social security
3. At least 20 successful business start-ups making innovative & high impact making products grounded and connected with the large scale institutional buyers
4. 9 local Facilitating agencies (FAs) provide services beyond Action, 50 Producer networks (PNs) created are vibrant, 9 CFCs created/strengthened, 20 equipment/ inputs suppliers and 140 BDSPs provide strategic services sustainably
5. At least 10 FIs provide credit through cluster financing instruments to 2250 MSMEs worth 9 million Euro
6. 200 Policy makers from SAARC countries sensitised and 9 Indian states initiate replication of similar intervention models

Project Partners & Associates





Foundation For MSME Clusters



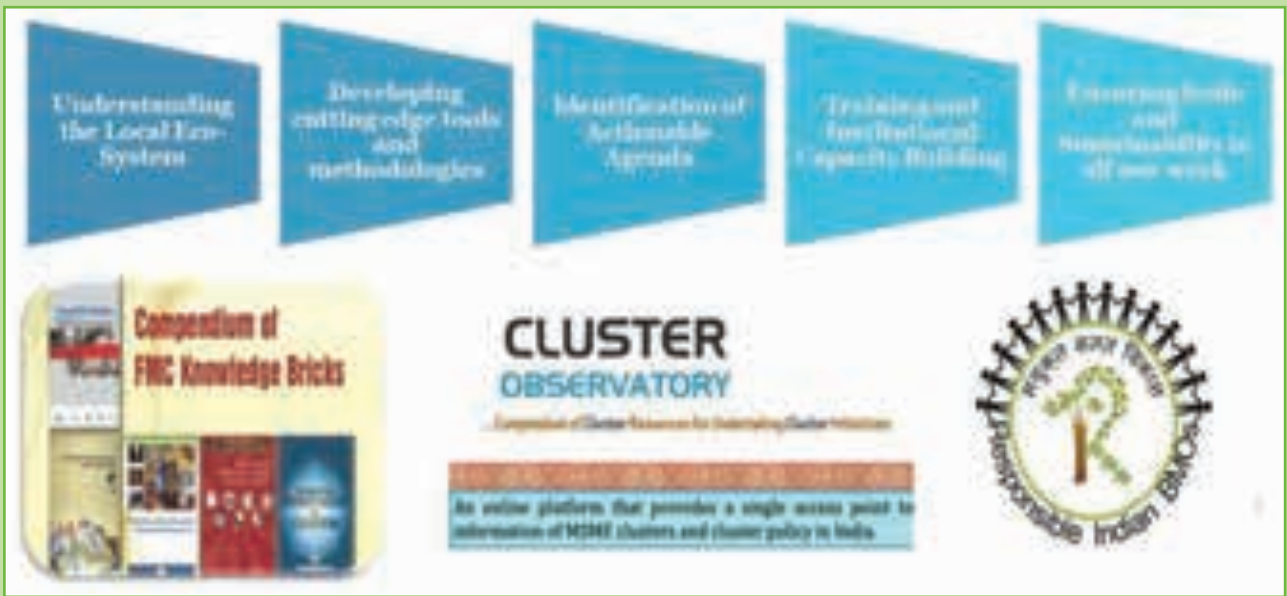
Promoting Integrated Bamboo Based Enterprise Development among SAARC Countries - India Component

Objectives of SAARC Initiative

- 1** Quality of life of farmers, artisans, micro and small enterprises, designers, traders and exporters improved through access to high value sustainable and efficient bamboo based enterprises
- 2** Stakeholders have better access to quality services & facilities for efficient production
- 3** Stakeholders have access to quality raw material for better production
- 4** Stakeholders have improved knowledge, skills and capacities for sustainable income



Foundation for MSME CLusters



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