



# **Bamboo-Based Sustainable Development Program**

## **A case study on restructuring the triple bottom line: planet, people & profit for creating a new tripod of growth**

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*Abstract* : The ever-increasing global, as well as local demand for sustainable products and innovative development, has placed Bamboo and its products into the center stage as a viable revolutionary solution that addresses many issues directly and indirectly, issues such as the utilization of available natural resources, creating opportunity for people dependent on the forest for their livelihood. An innovative comprehensive approach in developing a bamboo-based production-to-consumption model offering dynamic and scientific solutions from cultivation and management of bamboo from harvesting to product development and marketing, for the bamboo that has been cultivated in forest and in private land. It requires capacity building and integration at various multi-levels of multi-dimensional activities, alongside the capacity building of the stakeholders, research, and development, and large-scale awareness building program about the potential of the bamboo sector.

The study will begin by emphasizing the various market potential opportunities associated with bamboo-based products and projects, further, it will analyze the available resources and the kind of support and fundamental changes it require for developing a consistent and sustainable raw material resource of bamboo. The study will further explore the product part and the development of resources that are required to develop a value-oriented product that can cater to a larger domestic and international market, along with the same it will also shed a light on the social requirement in terms of awareness involvement and opportunity for the people.

The study talks further about the various initiatives taken by the Madhya Pradesh State Bamboo Mission which reflects the realization of structural change with potential for adoption and implementation in many parts of the country. Madhya Pradesh State Bamboo Mission (MPSBM) came into existence in July 2013 with an objective of functioning as the apex coordinating organization for implementation of projects reflecting National Bamboo Mission policy in Madhya Pradesh and other similar project given for its implementation. The department with an objective of utilizing the unexplored bamboo-based resources in Madhya Pradesh, has addressed and came up with a working solution for many interdependent dimensions such as the cultural, social, ecology and economy and became a pioneer in developing a new line of innovative products in bamboo products by assisting and guiding artisan so that they can offer their product in national as well as international market, developed and integrated alongside the product and resource development. The project is a long-term mission with the objective of thoughtfully utilizing the available resources of the region and developing a sustainable operational structure within public private partnership.

The study focuses on the projects implemented via MPSBM in and around Balaghat region as it covers the majority stake in the natural bamboo resources in Madhya Pradesh and developing a sustainable model for bamboo based product may have potential of being adopted in similar or modified manner in the other similar region of the state. Following the same there is a subchapter for summarizing the SWOT of the bamboo mission along with the features of STRATEGY that has been adopted for the same and the concluding paragraph depicts the positive note of development and the road ahead signifying developing future prospects in the sector for people associated with the same.

**Index Terms - Bamboo, Forest Resource Management, Sustaibility, Product, Capacity Building, MPSBM**

Bamboo Market offers many sustainable solutions or can be a part of solutions catering to many industries like infrastructure, textile, timber-based industries, end-user furniture, and many more. It has already shown its increasing demand for traditional products the global demand for bamboo-based products and the related market has grown significantly from almost \$75 billion in 2018 and is consistently growing at a CAGR of 5.0% till 2021, various agencies associated with this sector are collaborating, researching, and developing more bamboo-based products as a sustainable solution for addressing environmental responsibilities and related issues.

The market potential for bamboo products in India is estimated at ₹50,000 crores, or \$10 billion the national mission on Bamboo technology and trade development, under the Planning Commission, has estimated that bamboo can replace projected timber imports of ₹30,000 crores by 2025, and can replace India's Global dependency when its cultivation and use are properly encouraged within the nation.

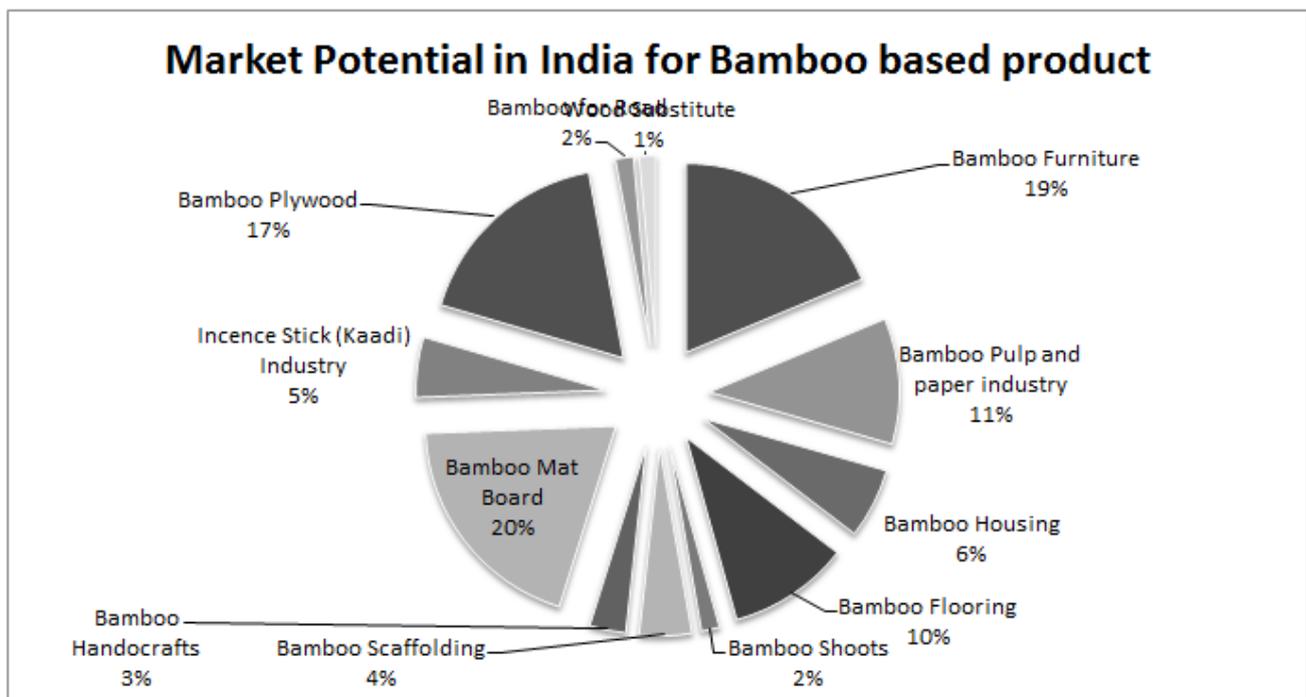
A multilateral organization working for this sector is "The International Bamboo and Rattan Organization (INBAR) which focuses on promoting sustainable development of the environment and ecosystem using bamboo and rattan. Since its establishment in 1997, for the past 20 years, the organization has grown to more than 40 members with a secretariat headquartered in China and regional offices in India, Ghana, Ethiopia and Ecuador INBAR has played an important role in representing over 40 of its members from the Global South and has been pivotal in increasing trade exports and related business around the world, thus bringing changes in terms of raising standards; promoting safety, resilient bamboo construction; restoring degraded land; developing and proving training program for practitioners; bringing awareness about the green policy and moving towards global sustainable development objective.

Bamboo is a versatile plant species capable of addressing solution for many factors such as ecological, economical and secure livelihood to the people. Traditionally in India bamboo has been confined in forests with two third of the stock located in North-Eastern States.

The increase in demand of bamboo from various sectors throughout the country, has led cultivation of the bamboo crop in jungles and farmland as a source of raw material. With an objective of utilizing this opportunity and the potential associated with bamboo crop, National Bamboo Mission (NBM) has been developed as a sub scheme of a larger objective of Mission for Integrated Development of Horticulture (MIDH) which is centrally sponsored under

Department of Agriculture & Cooperation (DAC), Ministry of Agriculture & Farmers Welfare, The Mission with a holistic approach for offering growth in all the associated bamboo sectors, has come up with area-based regionally differentiated strategy to increase bamboo cultivation, product development and marketing of the same. One of the major objectives of the mission is to increase the availability of quality seeds and plantation support for setting up new fields and nurseries and strengthening the existing ones. In addition to the same the mission has taken steps for developing handicraft associated with the same.

Madhya Pradesh State Bamboo Mission integrates the objective of National Bamboo Mission at state level with a regional strategy oriented towards overall development of the sector from developing resource level from raw material availability followed by processing plant development, product development and creating better market opportunity and platform for growth associated with the business.

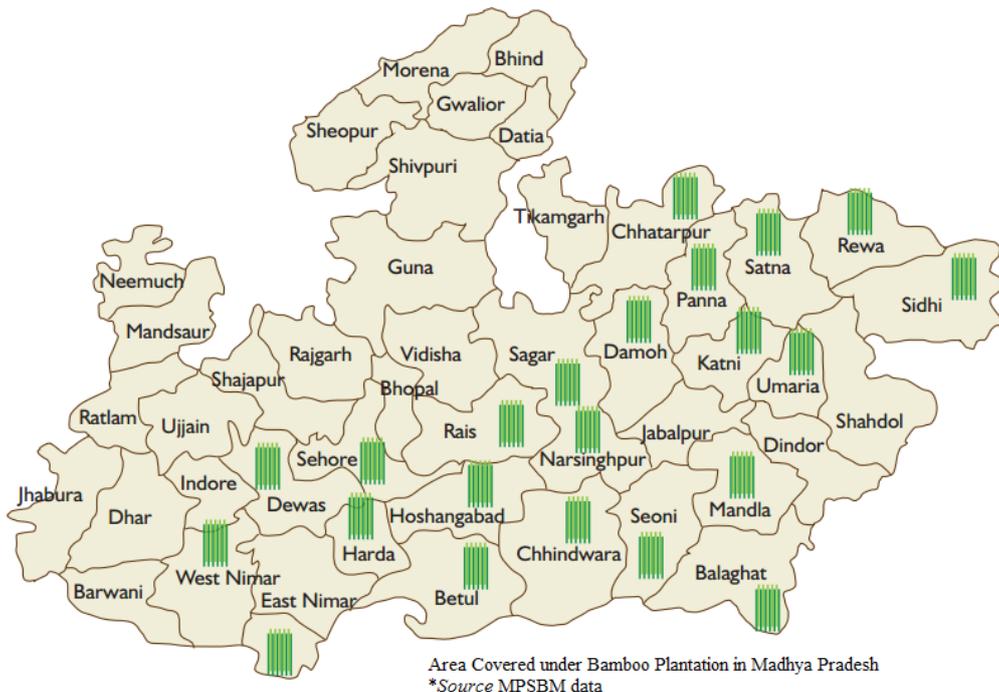


\* Source : MP State Bamboo Mission Vision Document

In India in terms of forest area, Madhya Pradesh is the largest state accounting for 20.3% of India's forest area. By the year 2015 MP's recorded forest area is estimated to be 94,68 sq. km which accounts for more than 30% of its total geographical area, out of the total forest area in Madhya Pradesh, the reserved forests constitute 65.36%, protected forests, 32.84%, and uncategorized forests, 1.8%. The predominant and commonly available species of bamboo in Madhya Pradesh is *Dendrocalamus strictus*—called 'desi bans' and found in nearly 80% of natural forests—and 'katang bans' which is *Bambusa bambos* can be found in 80% of private bamboo clumps. Other species include *Bambusa vulgaris*, *Bambusa striata*, *Bambusa nutans*, *Cephalostachyum pergracile*, *Schizostachyum pergracile*, *Gigantochloa rostrata*, *Bambusa polymorpha*, *Bambusa tulda*, *Dendrocalamus asper*, *Bambusa balcooa* and *Melocanna baccifera*.

S.No	Species Name	Local Name	Region in Madhya Pradesh
1	Dendrocalamus strictus	Desi Bans	North Balaghat, south Balaghat, north Betul, south Betul, West Betul, Bhopal, raisin, obedullahganj, sehore, Vidisha, rajghar, Chhatarpur, tikamgarh, north Panna, south Panna, east Chhindwara, West Chhindwara, south Chhindwara, Gwalior, morena, datia, sheopur, Bhind, hoshangabad, harda, indore, dhar, Jhabua, alirajpur, Jabalpur, katni, West mandla, dindori, khandwa, Burhanpur, khargon, Barwaha, sendhwa, Barwani, rewa, satna, sidhi, singrauli, north sagar, south sagar, damoh, north seoni, south seoni, narsinghpur, Umaria, anuppur, north shahdol, south shahdol, shivpuri, Guna, ashoknagar, Ujjain, shajapur, mandasaur, neemuch, dewas, ratlam
3	Bambusa vulgaris var. striata	Katanga Bans	north Balaghat, south Balaghat, Bhopal, obedullahganj, sehore, east Chhindwara, West Chhindwara, south Chhindwara, Jhabua, Jabalpur, katni, east mandla, West mandla, dindori, north seoni, south seoni, narsinghpur
4	Cephalostachyum pergracile		Jabalpur Katni
5	Gigantochloa rostrata (syn. Oxytenanthera nigrociliata)		South Balaghat
6	Schizostachyum pergracile		Information Not Available
7	Bambusa tulda		Rewa, Sagar
8	Bambusa polymorpha	Narangi Bans	Hoshangabad (Bori Sanctuary)
9	Bambusa nutans	Mala Bans	Private Plantation (Ranga) Jabalpur
10	Dendrocalamus asper		Private Plantation Jabalpur
11	Bambusa balcooa	Bema Bans	Hoshangabad
12	Melocanna baccifera		Information Not Available

MP has 13 lakh ha. Under bamboo, 17 roughly 5.93 lakh ha. 18 of which is under management of this, 45.13%—2.68 lakh ha consists of degraded bamboo forests. The area under bamboo has fallen by 44% over a period of roughly 25 years, according to a comparison of state-level working plans. The increase in the rehabilitation of degraded bamboo forest area in the same duration is 188%. Balaghat district has the maximum area under bamboo (40%).



The production of bamboo from natural forests in MP is estimated at about 75,000 NT. One NT is equal to 2,400 metres and the ratio of industrial to commercial (long) bamboos is roughly 65% to 35%. There is limited data available for bamboo production on private land. However, according to a rough estimate, about 20,000 NT of commercial bamboo is being harvested from farmlands. The total revenue from 1.04 lakh NT of commercial and industrial bamboo produced by MP in 2012–13, was pegged at 35.92 crores. In 2007–2008, the total revenue from 0.98 lakh NT of commercial and industrial bamboo produced by MP was pegged at 36.76 crore. The reason that the revenue for each lakh NT of bamboo increased only by around 3.38 over a five-year period may be that the supply of bamboo in commercial applications fell by approximately 50%, while the supply of bamboo in

industrial applications increased modestly. The current demand for bamboo for industrial applications in MP is 5 lakh NT, whereas the supply is a mere 0.5 lakh NT. Similarly, the demand for bamboo for commercial applications is 6 lakh NT, whereas the supply is 0.55 lakh NT. These figures indicate a huge gap of nearly 90% between the demand for, and supply of, bamboo in MP. This highlights the bamboo sector's enormous potential in MP, which can only be fulfilled through a long-term vision, and strategy for scientific management of bamboo resources on both public and private land. Currently, less than 30% of natural bamboo forest areas are being managed scientifically and/or harvested in a technical manner. Of 1.6 crore clumps in the natural forest, less than 40 lakh clumps are being managed systematically. This is mainly because dense bamboo forests are located in hilly terrains that are difficult to access, and because the low commercial harvesting rates are not commensurate with the intensive labor required for scientific harvesting. It is estimated that bamboo output can be doubled by correct management. It is also estimated that there is a potential yield of about 20 crore culms annually from private farms in MP's 22 bamboo districts. Managing these bamboo clumps on private land through an extensive and intensive 'Bamboo Extension Outreach Programme' (BEOP) could help meet MP's demand for bamboo. Also important is utilizing MP's bamboo resource for applications that facilitate livelihood generation and inclusive development. There are a total of 52,117 villages in MP, of which 21,797 are within 5km of the forest boundary. The processing of bamboo into value-added products by communities living in these villages could lead to inclusive and sustainable livelihoods through the bamboo sector.

#### Issues to be addressed

High Rate of bamboo depletion

- 80% culms already depleted
- 55% dead due to gregarious flowering

Lack of scientific management

- Potential of production of nearly 200 million culms annually on private land
- Lack of appropriate policy
- Policy intervention in transit rules and taxes

#### SWOT Analysis of Bamboo sector in Madhya Pradesh

STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
several new species have already been introduced	the production-to-consumption chains for these new species are not in place	new product development to leverage the new species along with market development	Generic products that are made from the same species from outside MP
existing cadre of traditional bamboo artisans from Madhya Pradesh	shrinking markets for traditional product range being produced by artisans	Leveraging existing skill base to manufacture new products and tap new markets	Bamboo products from outside MP
Largest state in terms of forest area in India	Difficulty in managing vast tracts of internal forests that are difficult to navigate	managing forests in a participatory manner by linking in forest communities	attracting new forest dwellers to the forest, thus creating an ecosystem imbalance
traditional bamboo craft and indigenous resource in MP	inadequate documentation on traditional bamboo craft and resource of MP	documentation of MP's bamboo tradition through print, video, museum, etc.	Competing need from MP's other traditional crafts
MP is a developing state with several cities which can be tapped as lucrative markets	Connections lacking between MP's bamboo producers and buyers	Facilitating bamboo-based markets in MP	markets for other produce in MP
Facilitative policy environment	Changing political environment may hinder a sustained positive policy environment	institutionalizing MP's bamboo activities	Premature change and/or instability in policy environment
ecotourism opportunities in MP	these opportunities have not been leveraged	Use of bamboo for creating tourist facilities including hotels, restaurants, ecotourism tracks, etc.	tourism strategies from other Indian states
Initial activities in MP have generated a lot of interest for bamboo in the state	Most of the interest comes from factions outside of MP	Building a cadre of local bamboo experts and professionals from MP who retain MP's investment	Migration of bamboo experts outside MP
Elite technical institutions which can help develop the bamboo sector	Most of these institutions are broad based, and not dedicated to bamboo	Introducing bamboo as a topic of specialization in mainstream courses	Focus on other materials in mainstream technical education

Expert resource persons who are poised to help MP in consolidating its bamboo sector	Difficulty in penetrating the government and public sector through standard processes such as issuing of tenders, which do not recognize the complexities associated with the bamboo sector	Creating alternate systems to engage expert professionals in the bamboo sector	Difficulty in changing established practices and mechanisms
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Keeping the facts in view and the potential of the region, operational bodies associated under Madhya Pradesh State Bamboo Mission (MPSBM) finalized the following working objective to address the situation.

- Strengthening the bamboo resource base.
- Capacity building and human resource development.
- Innovative product and design in alignment with traditional handicraft of the region.
- Production streamlining
- Building marketing linkage and production platforms
- Creating information repositories and discrimination mechanism
- Strengthening policy and institutional linkages.

### Strengthening the bamboo resource base.

A large amount of bamboo as an input resource is required for the planned activities for bamboo-based development and entrepreneurship, MPSBM has come up with the key activities to conserve, manage and supplement the existing resource base as outlined below

• **Bamboo-resource species and age-wise assessment** will be conducted, including inventory, utility and bio-regional analysis. Bamboo stock in the forests will be determined by species-wise GIS mapping, and bamboo stock in non-forest areas will be determined by participatory inventory.

• **The best potential utility of the existing bamboo stock**

Relevant expert institutes such as Forest Survey of India (FSI); Indian Institute of Forest Management (IIFM); institutes of Indian Council of Forestry Research & Education (ICFRE), Dehradun; Institute of Wood Sciences & Technology, Bangalore; Indian Plywood Industries Research Institute (IPIRI), Bangalore, and the Indian Institute of Technology (IIT) were involved in the process for achieving the set goal.

• **MP's bamboo species and ecotypes is identified** and preserved in situ by intensive rehabilitation of bamboo forests covering more than 30,000 ha. It is estimated that nearly 1,50,000 ha. of bamboo area will be restored in five years.

• **Bamboo species and ecotypes with commercially superior and desirable attributes for large-scale cultivation** has been introduced to augment the existing bamboo species in MP.

• **Bamboo forests and plantations is now being managed by correct management practices** in the field. A reputed institute, Tropical Forest Research Institute (TFRI), located in Jabalpur, has assessed the impact of proper management on the regeneration of the forests. A bilingual manual on best practices will be developed and used to build the capacity of a cross-section of resource persons—including from the forest department, self-help groups, community-based organizations, artisans, and farmers.

• **Hi-tech tissue culture labs has been established** in collaboration with reputed institutions such as Growmore Biotech Ltd from Hosur, Tamil Nadu, and the Ramakrishna Mission, Kolkata, to increase planting materials. The tissue-culture seedlings will be hardened in 12 nurseries established in various districts with common facility centres (CFCs). Finally, the shoots were planted in more than 60,000 ha. of forest area, by stakeholders including cooperatives, self-help groups (SHGs) and community-based organizations (CBOs).

• **Flowering of bamboo in the state will be managed**

• **Bamboo has been commercialized at the farmers; level by establishing a bamboo-producers, company, additionally efforts has been made to connect these with those who wish to source it as a raw material for their product.**

The pilot for this set up has been established in Jabalpur district, in collaboration with the Small Farmers' Agri-business Consortium. On successful implementation, it has now been planned to establish similar projects in other region as well.

**Capacity building and human resource development.** Capacity building of existing bamboo stakeholders, including traditional and non-traditional producers and entrepreneurs, will be done in order to build a cadre of bamboo professionals who will consolidate MP's bamboo sector and take it forward. Some of the activities that has been introduced can be summarized as

-Both traditional and non-traditional bamboo producers will be trained by expert institutions, such as the National Institute of Design (NID), School of Planning and Architecture (SPA), Indian Plywood Industries Research & Training Institute (IPIRTI), etc

-A cadre of potential bamboo entrepreneurs will be built by providing them with entrepreneurship training through institutes such as the Bamboo Entrepreneurship Development Institute (BEDI). These trained entrepreneurs have been then given financial aid via NABARD to facilitate their incubation.

-Formal academic modular courses in bamboo technology have been outlined and planned for traditional bamboo artisans in collaboration with institutions such as Dayalbagh Educational Institute (DEI), Agra, which is a deemed university.

**Innovative Design & Product Development** it is essential to utilize the available bamboo, through value-added applications, in a manner conducive to holistic sustainability and development. design inputs are essential to help MP's traditional and non-traditional bamboo producers to connect with viable markets through focused value-added applications. Design is a very important stage, as it orchestrates the entire production-to-consumption system (PCs), and thereby determines the sustainability of MP's bamboo products and systems, regular design inputs will be given to producer groups at different levels, from micro-enterprises to industries, by expert design consultants and reputed design institutes. MP's traditional bamboo craft was used as a

starting point to develop it in a more commercially acceptable product and new products according to market needs and requirements.

**Production Streamlining**

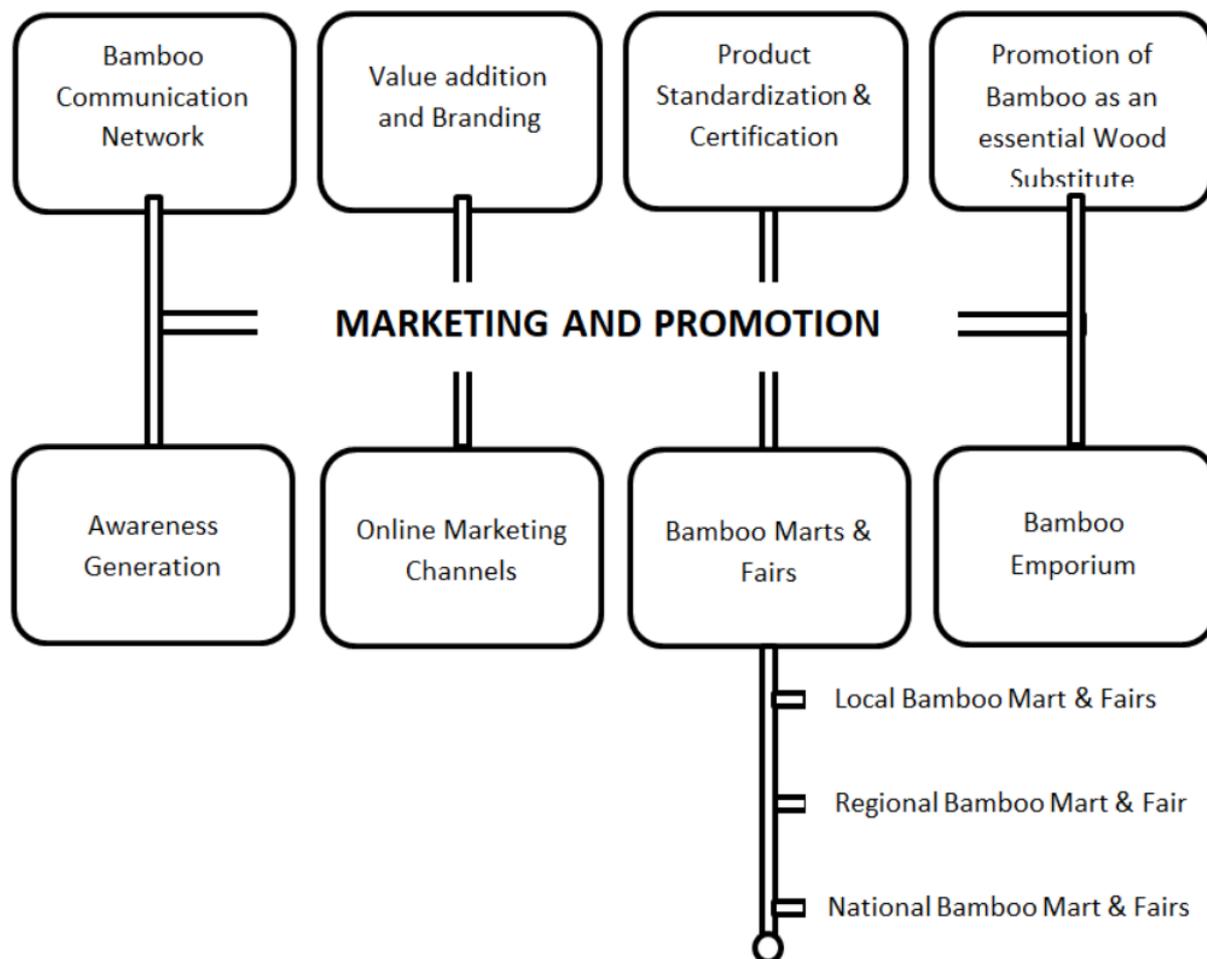
Optimal productivity, production quality, and production efficiency have been facilitated through inputs given to producer groups at different levels, from micro-enterprises to industries, by expert consultants and reputed institutions. in the form of activities listed below:

District-level CFCs were set up in all the bamboo-prevalent districts of MP starting from Balaghat to provide bamboo producers with physical infrastructure and machinery for dissemination of bamboo-production technologies and mechanization of bamboo production.

- Bamboo products have been planned to be given ISO certification, including for the sustainable management of the resource, process, system, chain of custody. High-quality treated bamboo will be used for production, which is now proposed to be available from treatment plants in MP's 12 CFCs.
- Cleaner production and technology have been introduced upgrading the existing production chains. For developing this process chains of different bamboo technologies have been studied for introducing inputs for sustainability and technology experts

**Building Marketing Linkage and Platforms** marketing will be aggressively facilitated to provide forward linkages to MP's bamboo production outputs, some of the activities for the same are outlined below

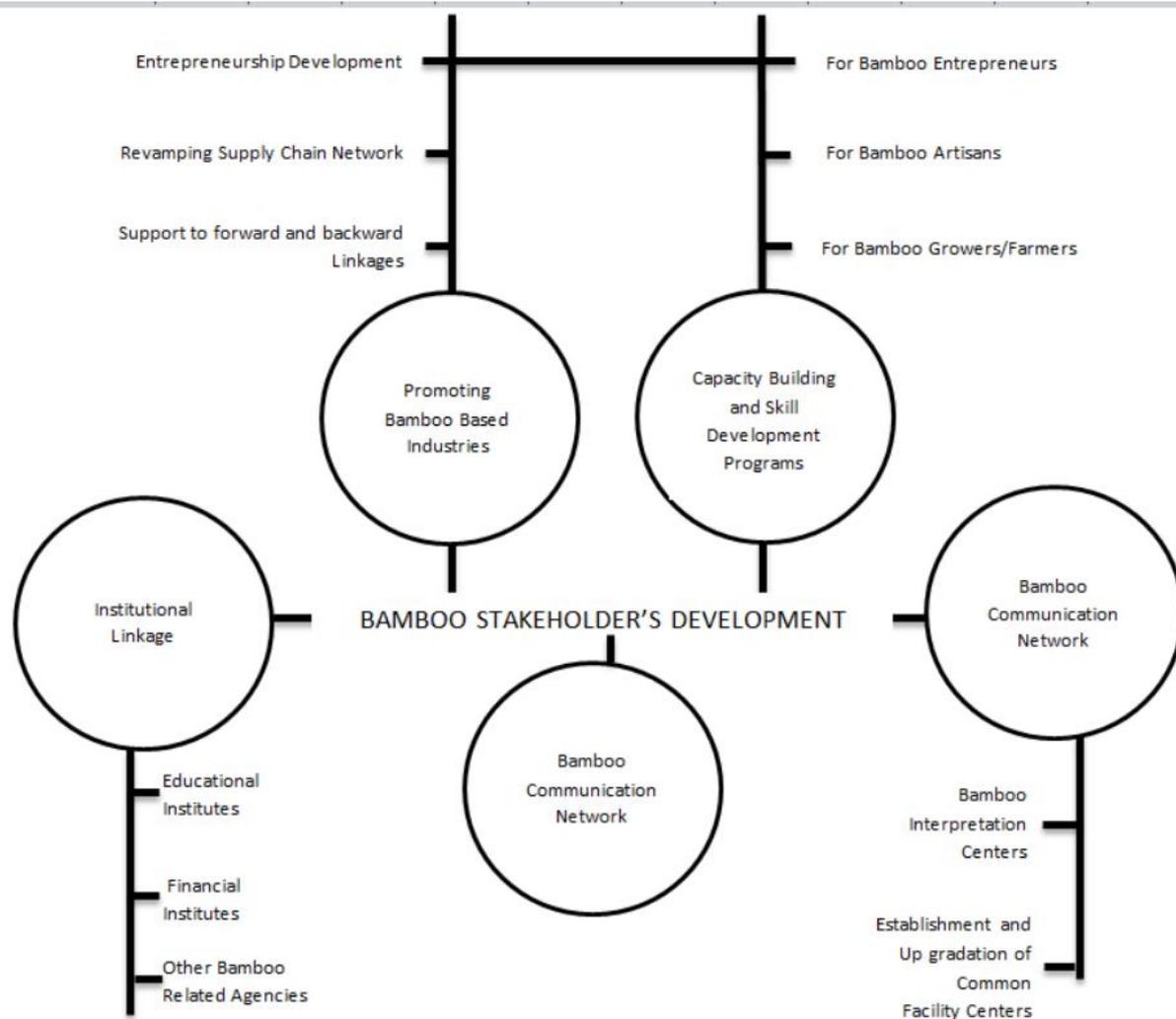
- An aggressive marketing policy will be put in place, to create massive and consistent awareness about bamboo as an eco-friendly timber-replacement material. Necessary mechanisms to actualize this, including **MARKETING AND PROMOTION** seminars, workshops, training programs will be planned and operationalized
- Artisans will be provided with marketing platforms and skills both at the level of urban centers and districts.
- A branding program for bamboo products for MP will be put in place. This will include a holistic sustainability labeling scheme and communication through a specific MP bamboo brand, in line with existing sustainability branding schemes such as UNIDO's holistic sustainability label.



**Creating Information Repositories and Dissemination Mechanisms.** information repositories will be created and mechanisms to facilitate dissemination of this information will be put in place. some activities towards the same are outlined below:

- A state-level district-wise directory of stakeholders, including registered bamboo artisans and entrepreneurs will be prepared. Registration for this will be done locally, through forest department, and also online through websites of MPSBM and the forest department.
- An extensive, multipurpose, user-friendly bamboo Web portal will be developed as an online platform to facilitate dialogue between different bamboo stakeholders. The Web portal will cater to the needs of a cross-section of stakeholders, including rural

artisans. This portal will help in registering artisans and entrepreneurs, inviting innovative ideas, establishing interactive linkages with stakeholders, and efficient marketing linkages.



## International Research Journal

**Strengthening Policy implementation and industrial linkages** following are the work has been done so far.

- A state bamboo development policy along with steering committee under the chairmanship of Chief Secretary, has been developed which will include a framework of incentives and subsidies, to encourage the setting up of bamboo industries and enterprises.
- It also functions as an established for negotiations with international organizations for bamboo project proposals.
- Stronger linkages have been established with state-level departments, including Panchayat & Rural, Commerce & Industries, Cottage & Village Industries, Tribal, etc., for effective convergence of technical and financial contributions.
- Collaborations will be facilitated with national organizations and institutes such as The Energy Resource Institute (TERI), IPIRTI, Institute of Wood Science and Technology (IWST), TFRI, NID, SPA, IIT (Delhi), Regional Research Lab (RRL) and DEI.
- A Nodal agency has been appointed by MPSBM for each and every district for coordination and policy practice and implementation.
- An institutionalized mechanism is under development and proposal through proper government order/s to maximize the use of bamboo in government infrastructure, such as furniture for schools, buildings for schools, Indira Awaas Yojna, etc.
- A technical support group (TSG) have been constituted under the chairmanship of PCCF (HOFF), MP. This TSG should include heads of national-level institutes relevant to bamboo. TSG is to provide technical inputs, and endorse MPBSM's projects and activities.

**Conclusion :** The application of the strategic operational model and implementation of the strategies in co-ordination with many interdependent state bodies and private non-government partnerships, the bamboo sector including raw material sourcing, product development, production process, creation of market and new platform has created more opportunities for the people associated with the same and in those regions such as Balaghat (having majority of the bamboo produce in MP) , this has brought an economic boost by creating more livelihood opportunities for the artisan and other people associated with the Bamboo trade. This business model when optimized may have an opportunity to be implemented in other region/states for creating a sustainable option reducing timber based import and creating more business opportunities locally and globally.