FACTORS IMPEDING THE GROWTH OF BAMBOO SECTOR IN THE ECONOMY OF NER AND ROADMAP TO MAKE IT A VIBRANT SECTOR OF THE NORTH EASTERN ECONOMY





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EXECUTIVE SUMMARY

TITLE OF THE STUDY

Factors Impeding the Growth of Bamboo Sector in the Economy of NER and Preparing Roadmap to make it a Vibrant Sector of the North Eastern Economy

Background to the Study

- Bamboos belong to the grass family Poaceae (Graminae). In India, there are 125 indigenous and 11 exotic species of bamboo belonging to 23 genera (Negi and Naithani, 1994)¹, with the majority stock of the bamboo resources found in the North East States. It contributes significantly to the social, economic, and ecological development of the Indian rural communities and accomplishes the United Nations Sustainable Development Goals (SDG-1; SDG-7; SDG-11; SDG-12; SDG-13; and SDG-15). It is estimated that there are about 2 million traditional artisans in India whose livelihood depends almost entirely on harvesting, processing, value addition, and selling bamboo products such as baskets, mats, handicrafts, and so on (FSI, 2019)².
- 2. The North Eastern region of India is rich in bamboo resources both in terms of its spread and in the diversity of bamboo species found. It plays a significant role in the general economy and the rural people's food and nutritional security, particularly among the tribal population of the region who uses this resource for food, shelter, furniture, handi-crafts, medicines, and various ethnoreligious purposes. The skill of working with bamboo is more widespread among all tribes of the region, with a large number of them, particularly women, capable of refined craftsmanship. The craft tradition of the North East often gives its most creative expression through intricate and myriad types of bamboo articles used as furniture, home furnishing & décor, accessories, jewellery, etc.
- 3. The industrial, economic and ecological potential of bamboo is yet to be fully explored in North East India. Despite decades of government initiatives and numerous multilateral projects of international agencies, the sector is still unorganized, with little work carried out for commercial and market-oriented cultivation with scientific management, raw material estimation, research and development with industrial application, standardization, architecture & engineering, industrial use, and ecological service, etc. The development of the bamboo sector can directly contribute to at least seven of the UN Sustainable Development Goals of poverty alleviation, affordable and clean energy, affordable and resilient housing, sustainable consumption, climate change mitigation, and terrestrial ecosystem protection. However, the present commercial use of bamboo is limited to low-volume handicrafts, lowend construction, and a conventional energy source.
- 4. In this regard, the Ministry of DoNER, Government of India has proposed a study that aims to identify the bottlenecks in the present bamboo ecosystem in NER and formulate a roadmap to provide an entirely new impetus to the sector across the region. The proposed terms of reference mentioned below endeavours to cover the bamboo ecosystem's significant sub-sectors so that a holistic plan for developing the bamboo sector can be prepared.

Terms of Reference & Scope of the study

5. The critical Terms of Reference (ToR) and the corresponding broad scope of the study are presented in Table-1.

S.N.	Terms of Reference	Broad Scope of the study
1	Assessment of the current status of the bamboo knowledge base through the lens of resource mapping; bamboo management practices adopted by the forest departments, tribal communities, agricultural farmers, and homeowners; assessment of existing knowledge base	 Assessment of current knowledge repository on bamboo resources of NER-Data on availability of bamboo production/coverage-cluster/variety/market demand wise Gaps in existing data/estimation through the lens of industrial/commercial application Scope of technology-enabled detailed estimation concerning commercial applicability Analyse bamboo management practiced in the region - both traditional & education-based Scope of organized commercial cultivation Scope of scientific bamboo forestry management
2	Analysis of existing bamboo value chain model of NER, products, and product categories	 Current status of value addition done at community level/entrepreneur/industry level (unorganized value chain & organized value chain) Status of value addition achieved through an improved package of practice under various programmes. Existing products and products categories produced in the region. Current status and scope for large scale industrial con- sumption such as paper/ pulp/ packaging/bamboo char- coal/ engineered timber for furniture & construction/textile/ shoot etc.
3	Status and gap in the existing mechanism of specialized human resource development in the bamboo sector for NER based upon value chain strengthening	 Creation of bamboo specialized human resource develop- ment by involving existing institutions within and outside the region. Status and scope of bamboo-oriented courses/programmes from the bamboo perspective with a higher degree of industrial use- such as chemistry, textile engineering, mechanical engineering, civil engineering, biotechnology, and nanotechnology. Status of research in the bamboo sector aimed at increased industrial use improved cultivation techniques etc. Status and scope of innovation and technology in the bam- boo sector and implementation in the NER bamboo sector.

Table- 1: Key terms of reference with the corresponding scope of the study

4	Estimation of the current bamboo market within and outside the region, export markets	 Estimation of the current domestic market Estimation of export potential Identification of potential export market Trend and demand of potential export market vis-à- vis current production status of NER
5	Diagnostic analysis of existing policy, legal & regulatory framework, and implementation mechanism for the promotion of the bamboo sector by various stakeholders;	 Study of existing regulatory policies related to bamboo- afforestation, environment protection, biodiversity con- servation, conservation, bio energy, green material pro- motion, climate change, land ownership, etc. Study of central and state missions and schemes related to bamboo sector development in NER Study of multilateral projects currently functioning in NER for bamboo sector development Expectations of international agencies and scope of con- vergence
6	Develop time-line based goals for bamboo sector development of NER with the aim of sustainable commercial/indus trial utilization of bamboo	 Factors to be considered- Enhanced bamboo productivity within and outside forests Technology-based micro and medium entrepreneurship Standardization of product and materials, Strategizing production of export market-driven products Strengthening of relevant organizations and institutions Use as an alternative to traditional materials (construction, energy, textile, etc.) Grass root level cultivators and organizations Best practices within and outside the region Private and community participation, traditional knowledge Scope for setting up new institution/incubators. Encouraging participation of academia and civil society Policy reforms Eco-restoration, climate change mitigation and adapta tion, and disaster response
7	Geographical and sectoral prioritizations within NER and fiscal and non-fiscal investments are required with specific time-horizon	 Strategy formulation for developing a bamboo economy based upon the geographical advantage of various clusters within the region. Prioritization of critical industries with the short, medium, and long-term development goal Indicative fund quantum required to achieve the goals. Indicative policy reforms and other incentives required to achieve the goals.

Synopsis of Findings

6. The North East State has ample potential for bamboo resources, traditional knowledge, and skills to produce the bamboo market-driven products to establish cluster-based business livelihoods and promote micro, small, and medium enterprises (MSE) for the overall economic development of the region. It has also accomplished the United Nations Sustainable Development Goals (SDG 1: End poverty in all its forms everywhere; SDG 7: Provide affordable, sustainable, and reliable modern energy services for all; SDG 11: Access to adequate and affordable housing; SDG 12: Efficient use of natural resources; SDG 13: Address global climate change; and SDG 15: Protect and restore terrestrial ecosystems). The traditional bamboo sector has been re-engineered through several interventions for one and half decades; even though the desired result could not be observed, the reasons could be sociopolitical and technological factors. The present study entitled 'Factors Impeding the Growth of Bamboo Sector in NER and Preparing a Roadmap to make it Vibrant Sector in NER Economy' has been attempted to find out the grass-roots hindrances to develop a 'participatory doable roadmap' for the region to upgrade the bamboo sector to make it competitive in the domestic and international market.

Bamboo Resource Development and Management:

- 7. The north-eastern region can also quickly transform its economy into a bamboo- based one by concentrating on intensive cultivation of a limited number of species, using high yielding selections, establishing primary processing centres and bamboo treatment facilities, and setting up industries in clusters to process and produce high-value products. To achieve this assessment, areas with the genetically poor stock of bamboo should be identified on a priority basis to be replaced by improved planting stock of the priority species with quality planting materials (QPM). The quality planting material could be produced by establishing household nurseries, community nurseries, and high-tech mother nurseries, tissue culture to meet the demand and supply of the priority species for the household enterprises, like the Tripura 'Namo' community, which produces bamboo baskets using B. polymorpha (local name Poura or Phoura). Therefore, the planting material should be developed, and strategic value chain should be addressed on the bamboo species' demand-based utility for value-added products. Melocanna baccifera (Roxb.) Kurz, commonly known as 'Muli bansh,' needs to be cultivated in homesteads, private land, forest land to protect the environment, food security (consuming shoots), and household enterprises. Further, it needs to build community capacity for sustainable harvesting and management practices.
- 8. Moreover, the cultivation of bamboo on public lands, if linked to household ownership, can boost the yield per unit area through a participatory approach. If the govern- ment adopts incentive-based measures, it will encourage more and more farmers to take up bamboo on their farmlands in combination with crops. This will motivate the farmers through enhanced earning, livelihood security, and diversifying their income from bam- boo. Intensive management and adoption of sustainable harvesting practices will also encourage the smallholder farmers, including the pro-poor silvicultural treatment (coupe management strategies), to meet the continued flow of resources to a particular cluster/belt-based industries/enterprises without deteriorating the gene pool of the species. Bamboo is amenable to both low and high-value products and can be an engine of sustainable development and economic growth in the region if the bamboo resources can meet the requirements continuously.

Enabling policy

9. An enabling environment is needed to promote the sector. The NER region should have standard policy practices on regulatory and non-regulatory aspects to strengthen the sector within the governance ecosystem of bamboo in the region. Moreover, the pol- icy for bamboo should be a Pan India policy in both letter and spirit. States must facilitate the inter-state transportation and sale of bamboo and its products without hindrance. Further across most states, the bamboo sector is still unorganised, with small and marginal farmers engaged in its trade. This must be consolidated through effective value chain development and appropriate policy frameworks. Developing a bamboo sector. This convergence can improve productivity on a scale, create a skilled bamboo workforce, and enable access to markets with products designed and developed to meet changing market demand. Connectivity issues will be overcome by mass production of multiple bamboo products making rail transport cost-effective.

• The lack of restriction or regulatory framework to monitor the collection of bamboo, including young bamboo shoots from the forests other than notified reserved forests, has been reported by states as a hindrance to the overall development of bamboo. Therefore, this must be regulated through a mechanism that monitors but does not hamper local livelihoods.

• States' governments feel that they should have the liberty to harvest bamboo and other minor forest produce from the forests depending on their silvicultural availability. This should be decided by the respective State Forest Departments in conformity with the prescription in the Working Plans, if any, approved or awaiting approval of the MoEF&CC and without insisting on having an approved Working Plan or Working Scheme or requiring to obtain the consent of the Regional Empowered Committee, Regional Office of the MoEF&CC as harvesting mature bamboo is beneficial for the improvement of bamboo stock in the forests.

• Necessary guidelines for harvesting bamboo in forests and non-forest areas with a sound implementation strategy need to be put in place to enable state governments to have the liberty to manage and harvest bamboo, and other minor forest produce within the ambit of the guidelines and advisories from the Central Government

• Policies on bamboo development must recognise the role of traditional and local governance bodies and emphasize strengthening and building their capacities to facilitate the various phases and activities of bamboo enterprise development and its manage- ment.

• The unique land ownership system must be considered an opportunity to further bamboo development in northeast India. Therefore, policies should be framed in consultation with the local and traditional community-based institutions to ensure that all bamboo development activities are undertaken at a landscape level with appropriate land-use plans and enterprise development strategies. Despite varying assumptions that the land tenure system is a problem, none of the states4 that responded to the survey for this report mentioned the prevalence of community or private land tenure systems as a challenge.

• The sector in NER also lacks reliable data on raw material and trade intelligence, as well as limited research and development for industrial applications. Inadequate credit linkages, lack of high value-added products, etc., must be recognised and ad- dressed in policies and strategies with appropriate statutory frameworks.

• Policies related to bamboo must be aligned with the State Action Plans on Climate Change and other strategic frameworks related to the Sustainable Development Goals being anchored by the Niti Aayog and state governments. The policy should create space for further research on awareness of bamboo and its climate change mitigation benefits; and explore linking bamboo plantations for carbon credit in afforestation and reforestation activities related to CDM (Clean Development Mechanism), VCMs (Voluntary Carbon Markets), REDD credits, etc.

Upgrading value-chains and market development

- 10. Upgrading value chain depicts the bamboo sector in the North East States will make diversified marketdriven products, improve efficiency, or perform skilled-based activities for participating in high-end domestic and international markets. It changes production processes to improve productivity and products to meet the current market's demand and prepare for the future market. There are four broader areas of upgrading the value chain for the sector addressed in the roadmap.
- 11. *The value chain* coordination in the bamboo sector needs to focus on horizontal and vertical coordination. The horizontal up-gradation will reduce costs, increase revenue and reduce risks. Moreover, non-chain actors such as reputed NGOs, MFIs, and development project partners need to collaborate and address power relations with weak spokes or SHG members within the cluster. The vertical coordination focuses on longer- term business relations with petty traders, processers, and bamboo suppliers through negotiation and contractual agreements. It needs to organize awareness and sensitization programs for different stakeholders from time to time. The local village panchayat will be a valuable platform for building coordination.
 - 12. *Process and product up-gradation* in the bamboo product process is a real challenge. Enhancing performance in a different or particular node in the value chain through introducing new technology or establishing a common facility centre and pro- cess costing will add value positively. The upgrading process involves improving productivity to increase volumes or reduce production costs. Product upgrading involves im- proving product quality (e.g., certification, safety standards, traceability) or moving to more sophisticated products (e.g., processing, packaging) and is often linked to process upgrading. It could be done by introducing contemporary design development on life- style products in diversified ranges; using pro-poor technology, tools, jigs, and fixtures for product quality control; production in volume; facilitating the appropriate artisan- friendly machines, tools, and fixtures for product standardization; quality improvement and quantity of products.
- 13. Changing and adding functions in value –chains need to include functional up- grading where producers or other actors in the chain take on new functions such as the provision of inputs or services. It can also be inter-chain upgrading, where an actor takes skills and experiences developed in one value chain to engage productively in another. The potential artisans will be encouraged as a business partner in the cluster for sup- plying raw materials or managing raw materials banks.
- 14. The upgrading institutional environment involves business development ser- vices for building a business eco-system through policy support. The present bamboo and cane cluster has local institutions like the SHG federation and direct support from the Government. Further, it needs to improve for better functions for encouraging private investors to the scaling-up business. Encourage public and public partnership (PPP) in the cluster for more extensive business development.

Research and Development and Building Human Resources:

15. Setting- up a higher technical institution focusing initially exclusively on bamboo may be established in the North-Eastern region as a platform that can cater to the entrepreneurs, researchers, and the industry. This will encourage collaborative exercises to take place, looking at the NE bamboo sector through the lens of developing intellectual properties with industrial orientation and fostering the development of the NE region as a destination for global bamboo experts, agencies, and industries.

- 16. It is suggested that the new institute be a dedicated national institution, building a new model for research and development for sustainable development, keeping bam- boo at the centre stage in which traditional knowledge and skill relating to the use of bamboo shall be blended with the contemporary understanding of science, engineering, and technology for creating human resources who shall contribute towards a green economy that is sustainable, value-based, culturally relevant and universally acceptable.
- 17. With diverse mandates, including the development of bamboo as a resource and its sustainable management, a significant focus of the institute should be R&D and Innovation. Thrust research areas for each domain shall be worked out within a multi and cross-disciplinary framework. The primary focus of the research should be on the development of products that have industrial applications to add to the country's intellectual property. Two Research Incubation Centres –one for Science and Technology and the other for Liberal Arts, to be set up with industry partnerships that shall act as the nuclei for supporting research and innovation at the University. It is envisaged that the institute shall collaborate with organisations and institutions from the industry, company, Government, and Non-Government sectors. The collaborations shall be for academic, re- search, and consultation activities. The institute shall have the mandate to forge a partnership with the organisations and institutions of south-east Asia within the framework of the bi and multilateral treaties and conventions of the Government of India.
- 18. The suggested institute should engage in study, training, and research leading to the generation of knowledge, creation of quality human resources, and technology innovation to cater to the growing demands of the bamboo-based economy and industry and have close synergy with the relevant industries of the nation and the world in every sphere of its academic activities. It shall embark upon research related to the industries in close collaboration with industry experts. It shall work out new models of industry- academia interfacing whereby not only the experienced and qualified faculty members shall take up industry-related issues needing research, but there will be provisions for engaging the entrepreneurs for their creative and innovative ideas. The various divisions within the institute will be encouraged to take up consultancy/ Projects from the Industry and other stakeholders, engage in effective HR and Technology Transfer mechanisms, etc. An appropriate IPR cell should be provided to safeguard intellectual property.
- 19. The establishment of market linkages, research and development, and funding remains weak, and the governments must prioritize intervening in these areas. A comprehensive policy that addresses these issues through institutions like the Cane and Bamboo Technology Centre (CBTC) and linking it directly with institutions like CSIR-NEIST, ICAR, RFRI/ICFRE, or CRLT will be practical and beneficial.

The policies on bamboo must also give special attention to the gaps in quality human re- sources (technical and managerial capacities) of lead institutions and agencies to ensure that strong enterprises are developed in the region. It must also provide proper hand- holding of entrepreneurs and link them to appropriate sources and services to learn and grow with appropriate access to technology, financial services, product development knowledge, and market information. These matters are all dealt with separately and, therefore, do not achieve the impact as per the efforts and resources spent.

20. Finally, it needs to build vital networking and partnership and south-south knowledge transfer to address the above-mentioned gaps to upgrade the bamboo sector development to capitalize the resource for this region's economic and environmental benefits.

Summary Roadmap & Recommendations for Bamboo Sector Development

- 21. There should be effective policies at the regional and national level to trigger the growth of bamboo sector which can promote producer friendly environment to benefit sale of raw bamboo and at the other hand it should also foster the growth of bamboo plantations and industries.
- 22. Database should be generated on species specific resources and products should be standardised by developing species specific clusters by linking it with bamboo promo- tion council. In addition, markets for each of the products should be determined to create network among the stakeholders for more effective products which are in high demand in potential markets.
- 23. Sustainable management of bamboo plantations for effective certification: Standardise product design, uniformity and quality of produce which are traded in countries fetching higher price. Suitable sustainability certification of managing bamboo plantations and products produced should also be sought for green product promotion.
- 24. Effective Clusters should be formed in areas having problem of poverty, unemployment so that suitable livelihood options can be generated for economic development of such areas. Conducive and suitable policy should be framed for development of such cluster. Clusters should be effectively linked with markets which can fetch higher price to their products. Governmental and Non-governmental initiative should be taken up to promote value added products.
- 25. Effective Policy should be framed for financing and investment of bamboo enterprises, cottage industries, SME's etc. Nationalised banks should be Linked for promoting SME's, cottage industries. There should be suitable policy for insurance of the bamboo industries. Standardised methods should be documented, advertised and popularised for financing and investment of bamboo enterprises. Governmental and Non-governmental initiative and schemes should be promoted for establishing industries and growth of bamboo sector.