Model for Employment and Enterprise based Skill Development for Bamboo based communities, Artisans, Designers etc for the Bamboo Sector

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Abstract

Bamboo plays a key role in the daily lives of 1/5th of the world population even today in many countries in Asia, Latin America and Africa. In many places expensive wood, steel, concrete, glass etc. and other such materials have replaced Bamboo- labeling it as a 'poor man's timber', a 'poor man's building material' etc.

But of late Bamboo has liberated itself from this stigma and emerged as the 'Greenest of the Green' material. It is the most fashionable material in vogue today and is in great demand across the world for buildings, interiors, landscapes, bridges, energy, ethanol and diesel, fabric and several other applications. There is a great market awaiting this beautiful, highly sustainable engineering material. But the number of Architects, Designers, Manufactures, Entrepreneurs, Govts., and Policy Makers etc taking this material seriously is still very low in spite of its high market demand.

On the other hand, we have a large number of bamboo based BPL communities across the country. As per Mr. Oscar Hidalgo, the grandfather of Bamboo Architecture, Indian bamboo craftsmen are the best in the world. But these craftsmen are leaving their trade and migrating to cities in search of work as their bamboo skill does not generate sufficient income for them to support their families. They become casual labors, security guards etc and live a life of poverty in unhealthy slums in cities.

Somehow the demand-supply chain of this material and its products is not getting established.

The Missing Link?

This paper is an account of the efforts made by Center for Green Building Materials and Technology, Bangalore to find and establish the link between the Demand and Supply of Bamboo and its products, and ensure Bamboo its rightful and respectful place with other modern Materials in its contribution towards an Integrated Sustainable Development of Bamboo based communities and the bamboo sector in the world.

1. Introduction

The rapid increase in greenhouse gases in the atmosphere, land degradation, increasing floods and droughts, deforestation, loss of biodiversity and productivity are leading to ecological crisis affecting livelihood options for development and increasing poverty, pollution and unsustainable development.

Theme: Community and Economic Development

In this scenario bamboo stands as an ideal solution capable of achieving soil and moisture conservation, repair of degraded lands, ecological, food and nutritional, livelihood and economic security because of its manifold uses and industrial applications rendered possible by recent advances in technology.

2. Bamboo

2.1 The Material

India is the second largest producer of bamboo in the world with 136 species in 9.57 million hectare of forest and approx equal area under homesteads (Figure 1). Annual production of bamboo in India is about 4.7 million tones. It is the fastest growing woody plant in the world and hence has the highest rate of fixing carbon dioxide. It can play an important role in soil and water conservation. It is eminently suitable for housing and general engineering because of its high weight /strength ratio, high flexibility and tubular anatomy. It can be used to make several utilitarian products of daily usage. It is a unique group of giant grasses with the habit of *sympodial* (in tropics), *monopodial* (in sub tropic and temperate) and intermediate types.

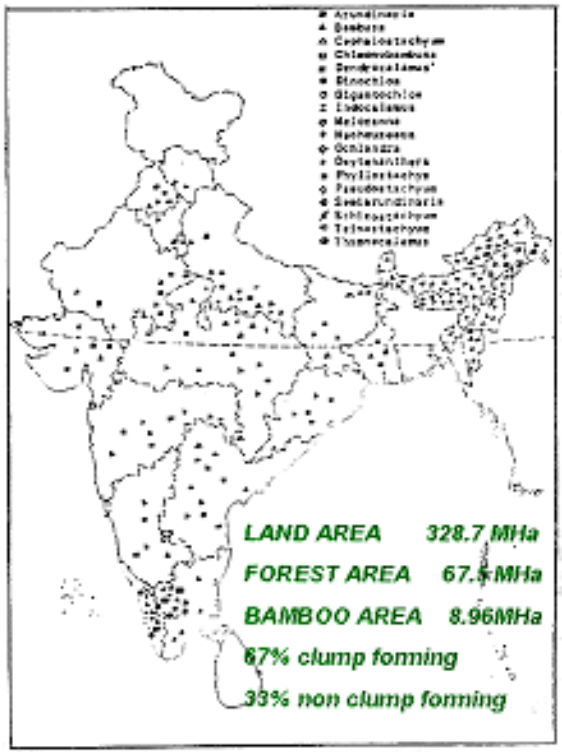


Figure 1:

2.2 Bamboo based communities

India has several Bamboo based communities who live in villages in forest areas or at the fringes of forests and depend on forests for subsistence. It has been an integral part of their lives and livelihood since time immemorial. Due to this dependence they have nurtured and protected bamboo forests for centuries. They use it for construction, fences, weapons, food, daily utility items and crafts (Image 1). Bamboo has been a natural capital that has helped them to keep afloat even in times of significant cash crunches. Hence, bamboo can be made a vehicle of sustainable economic development for these rural and tribal communities to

provide them opportunities to earn a sustainable income and improve their standard of living. This will also stop their migration to cities thereby solving several other issues.

Image 1:

2.3 The Market

According to National Mission on Bamboo Applications, the global market of bamboo including internal and commercial consumption was to the tune of US$10B and is expected to double by 2015. The annual trade of bamboo in India today is approximately Rs: 10,000 to 15,000 crores . This is only a small margin of its actual potential which is expected to grow at a very fast rate (Table 1).

The current and expected size of the market for some Bamboo products are estiamted as below:		
Product /Application	**Current Market Rate (Rs)**	**Expected Market (Rs)**
Bamboo Shoot	4.8 crores (2001)	300 crores growing at 25%
Bamboo as wood substitute	10,000 crores (imported value)	30,000 crores (in next 20 years)
Bamboo plyboard	200 crorers	500 crores
Bamboo plyboard for use	1000 crores	3408 crores (in 2015)
In truck and railways		
Bamboo flooring	100 crores (Domestic)	1950 crores (2015)
	100 crores (Export)	
Bamboo pulp	100 crores	2088 crores (2015)
Bamboo Furniture	380 crores	3265 crores (2015)
Building and construction Material		
Scaffolding	-	861 crores (2015)
Housing	-	1163 crores (2015)
Roads	-	274 crores
Bamboo grids	-	1000 crores (2015)
Tiny and cottage industry		
Agarbatti,Micelleaneous(Ice cream sticks, fire crackerLathins, ladders,etc.,) Pencil IndustryMatch Industry	394 crores	600 crores (2004)

Table 1:

About 2.5 billion people use bamboo globally and 1.0 billion people live in bamboo houses. Indian bamboo sector generates approx 432 millions workdays annually.
Bamboo is a multipurpose agro-forestry crop and has been an integral part of the Indian culture. Apart from its potential as a timber and handicraft material , bamboo is acknowledged to have a great potential as a non-conventional energy source as per Technology Information Forecasting and Assessment Council (TIFAC).

Image 2:

Image 3:

Image 4:

Image 5:

Image 6:

Image 7:

3. Employment and enterprise in bamboo sector

Bamboo has over 2000 uses in our daily lives.

3.1 Demand scenario

Due to the latest developments, Bamboo poles and its products are in high demand for various uses, from housing, paper, textiles, handicrafts, agarbatti, life style products, energy etc. The composition of the some of the industries in 2007 is shown in (Figure 2).

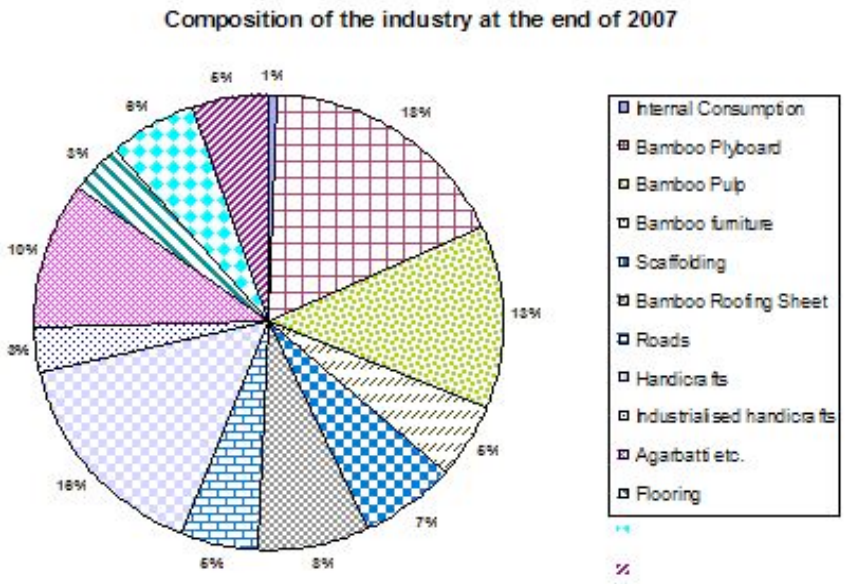


Figure 2:

The growth rate of all the above industries in the table above will depend on the demand for the products. The demand , in turn will depend upon the increasing acceptability of the products in the national and international market. And, the acceptability of the products will depend upon:

- Bamboo products being cheaper than other substitute materials like wood, steel etc
- Bamboo products being more durable and aesthetical;
- Mass usage of bamboo in government projects as demonstrations;
- Community appreciation of bamboo as a sustainable livelihood crop;
- Acceptance of bamboo as a preferred material for lifestyle products for the high end market etc and several such factors .

But there is hope for resurgence of bamboo based on the several new and contemporary economic opportunities that have emerged over the past decade. A bamboo revolution is being heralded that holds the potential of reversing economic downturns and ensuring profitability. Bamboo can ensure the triple bottom line of environmental, economical and social growth of integrated sustainable development.

3.2 Supply scenario

Except for some of the fully industrialized Products supply, most of the other Products depend on the artisans. Majority of bamboo artisans are involved in the same kind of activities of traditional artisanship. The designs and products range which they produce are mostly traditional products and the productivity and quality is generally poor due to several reasons, viz.

i. Lack of knowledge of preservation and treatment (products produced by using non-treated bamboo) ;
ii. Lack of knowledge about tools, jigs hence poor joinery techniques ;
iii. Lack of knowledge of high quality finishing ;

iv. Lack of knowledge on various product designs & technologies ;

On the other hand, bamboo as a material does not figure in the curriculum of architecture, engineering and design institutes or in the polytechnics, with the result that its usage in designed buildings and products is very low.

As a result, the product output in the market is severely lacking both in quality and quantity . The quality does not match the international standards. And since the artisans do not have appropriate training and access to modern tools and machinery, they cannot supply large volumes. The gap between the finishing quality and design of the traditional products and the market demand is huge. As a result, the artisans have to sell their products in local markets at low prices resulting in economic loss. On the other hand, the consumer does not get the products as per his/her choice and standard. Hence the supply chain of Bamboo products does not complete.

Image 8:

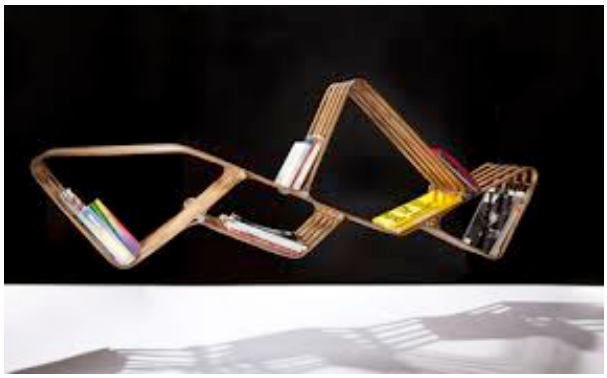


Image 9:

4. The missing link

Based on the above analysis of demand -supply scenario, the missing link in the demand-supply chain seems to be the serious dearth of Human Resources at every level with the required skill sets for the sector- from Architects, Designers, Engineers, Scientists, and Entrepreneurs etc to mid level Supervisors, contractors, to execution level skilled Workers and Artisans . A comprehensive structured Skill Development Program combining basic education and vocational courses for various technologies related to Bamboo could establish this vital link and seems to be the need of the hour.

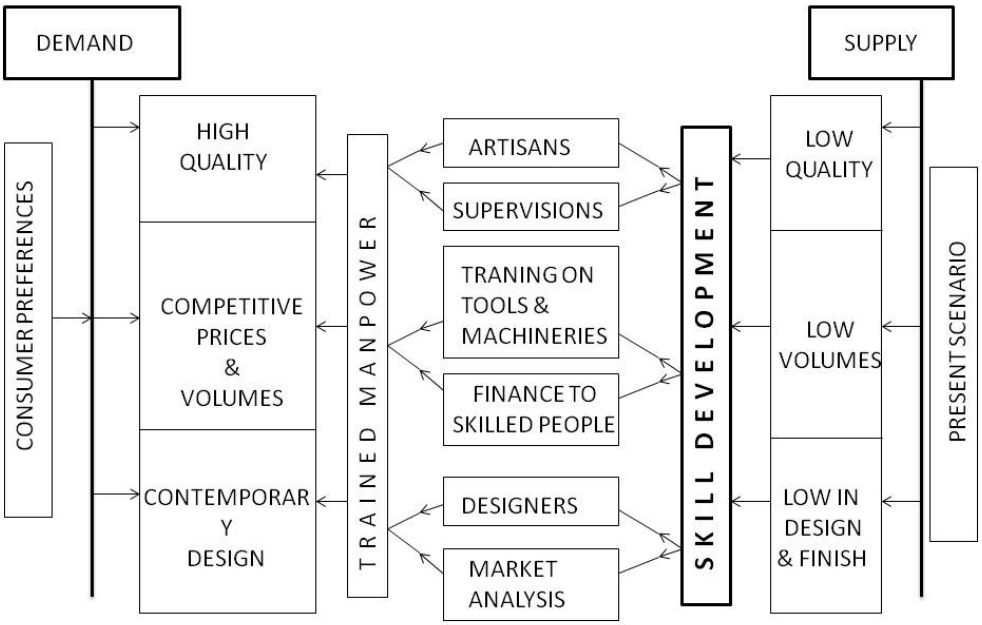


Figure 3:

5. Skill Development

5.1 What is skill development?

Skill development refers to employability which is required at every level of the value chain. We have people trained under several training programs run by the government NGO's and other organizations for various sectors, but they are not employable. Shortcomings in skill development is the single most constraint to healthy and rapid growth of our industries and economy in general. This situation is even more serious for the bamboo sector where it is still not recognized as a fully fledged industry.

According to a report by Ernst and Young in September 2012 for FICCI, only 10% of Indian workforce undergo some training and 80% get no opportunity for trainers. Most of the trained persons have certificates but are not employable. Hence they either don't find jobs or drop out because of low pay, poor working conditions, lack of job near home and even low status of jobs. For rapid growth of our industries it is important to ensure the availability of skilled labor.

Skill is not about education, but about education for employability. It has to be a combination of theoretical and practical education so that the students are directly employable as soon as they pass out of schools. This requires to bring vocational and formal education together, especially for sectors like bamboo which connects to the rural and tribal populations. And this needs to be approached from the lowest level and vertically linked to higher education at the university level.

Lot of research seems to have already been done by various institutions in the sector, but very low percentage of the findings have reached the industry or benefited the common man, what to talk about the marginalized bamboo based communities. We need to focus on inclusive growth of all the stakeholders and make both quantity and quality jobs available for a balanced growth of the bamboo sector.

5.2 Skill development and the bamboo sector

Theme: Community and Economic Development

Communities in India have various traditional skill sets in working with bamboo. Several states of India are ideally suited for development in various sectors of Industrial Development and Tourism dependent on forests. Due to geographical factors and nature of the existing industries, industrialization is presently concentrated in the border areas of these states, whereas the other areas have been relatively unaffected by the process of industrial development. Bamboo is an important resource available in most parts of India.
Skill Development in Bamboo can be the means by which the industry and the community can be integrated profitably, since bamboo generates large scale rural employment in the management of bamboo forests, harvesting, collection, transport, storage and processing. The basic bamboo processing skills are already available due to the prevalence of traditional bamboo working in India, and employment opportunities for both rural and urban workers would be enhanced with Skill Development for the industrial applications of bamboo.
Although the traditional bamboo skills are of widest range, the nature of demand for the handicrafts products in metro markets, local town markets, export market, is changing dramatically. Preferences have changed from traditional to contemporary and from decorative to utilitarian.

In the programs of skill development for the bamboo sector, economical benefit to the person is very important especially at the lower levels. There has to be efficiency benefit as well, which has to be brought through better quality and innovative training programs. The skill development will need to connect to the industry and demand, and curriculums will have to be devised according to the needs of the industry.

6. CGBMT- Center for Green Building Materials and Technology, Bangalore

6.1 Organization, Activities and Milestones

CGBMT is a trust registered under societies Act, engaged in Eco-literacy and Eco-education programs for over a decade. It touches upon a wide range of aspects of sustainable development, i.e., social, economical, environmental, eco-friendly materials, processes and technologies for various sections of the society. It conducts awareness programs, workshops, short and long field training programs and courses etc for school children, women, artisans, architects, engineers, designers, corporate and officers up to policy level bureaucrats.
CGBMT has developed structured courses specifically for skill development for the bamboo sector and has been running them for the past 4 years.

6.2 Vision and Objectives of skill development in bamboo sector

Keeping in view all the above factors about bamboo, the communities, demand and supply scenario and the need for Skill development in the bamboo sector, CGBMT has kept the overall vision for Skill development programs for the bamboo sector to be “Bamboo for Integrated Environment friendly development through generating quality employment opportunities for the masses”. To fulfill this mission it has considered the following:

6.2.1 Introducing bamboo as a potential material of economic activities, through awareness programs, seminars, workshops, 1-2 days short courses, structured courses etc. as a concentrated effort toward mitigation of the adverse effects of mindless development for artisans, general public, architects, engineers, scientists, policy makers etc.

6.2.2 Through these programs , generate workforce for the bamboo sector i.e. bamboo based buildings, furniture, handicrafts, bamboo based industries etc. through structured courses of varying duration and levels through distance education program.

6.2.3 Education and upliftment of living standards of rural and tribal population by teaching them better and scientific ways to build their homes with locally available materials using bamboo and providing livelihood security through training for management and utilization of resources available to them i.e. introducing bamboo based cottage industry or other small scale industry based on forests.

6.3 The overall objective of the programs is to improve productivity with quality, income for artisans and leading them towards producing market oriented quality products, thereby ensuring economic, efficiency, environmental and social benefits-a win-win situation for all the stakeholders.

6.3.1 Up-gradation of skills of artisans through appropriate designs and technology intervention by vertically connecting the designers and experts with the executing and supervisory workforce.

6.3.2 Improve the competitiveness, to gain access to new market, to develop new products, thereby generating positive growth and employment.

6.3.3 Provide appropriate training and support for improved quality and productivity, and enable them "access" to a larger market segment for utilitarian products.

6.4 Outcomes Envisaged

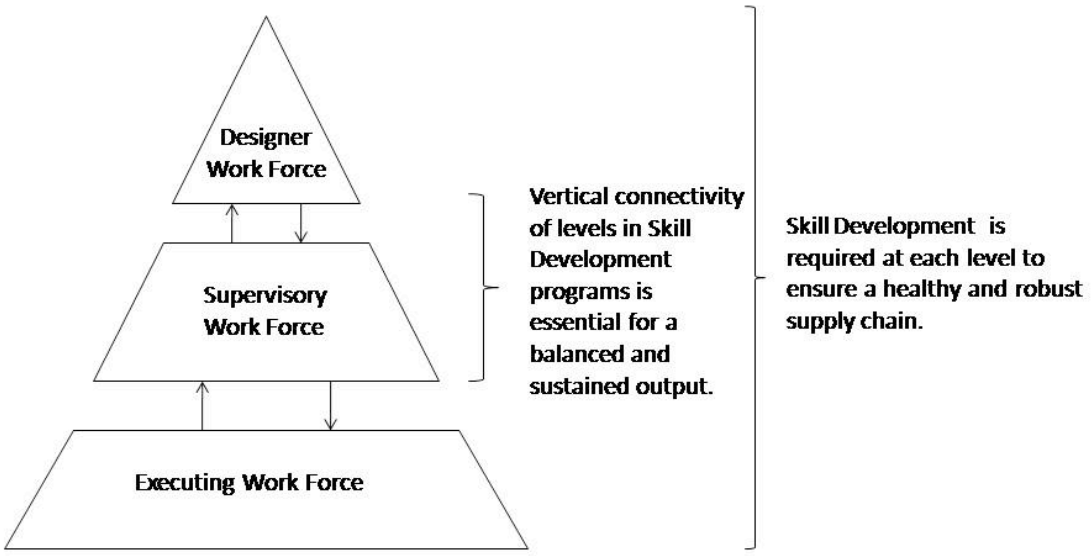
Through the proposed training activities, CGBMT hopes to be facilitating the:

6.4.1 Transformation of the "artisans" to "entrepreneurs" by introduction of new designs and technology, providing training for the up-gradation of skills to the community members, building their entrepreneur skills, creating awareness about the market potential, introduction to tools, jigs to increase the quantity and quality of production, will be an effective intervention. This will facilitate the community to venture into Bamboo sector and will provide alternative employment opportunities to the rural community which will gradually reduce their poverty.

6.4.2 Generating supervisory level workforce to ensure quality in production by introducing diploma level programs.

6.4.3 Introducing architects, engineers and designers in the sector to ensure new and contemporary designs and products of national and international level to increase the competiveness of our products. This can be done through online PG programs with series of contact workshops, executive programs etc.

6.4.4 Vertical interaction among the three levels (Figure 4).



Note: Size of box indicative of volume of skilled workforce required for the Industry.
Figure 4:

6.5 Focus in skill development programs

In all its skill development programs, CGBMT focuses on three major issues:

6.5.1 Capacity building of the artisans: This is a major component that has been promoted under Common Facility Centre approach. Regular training is imparted to artisans on bamboo crafts making, bamboo products, bamboo buildings etc. with few artisans trained as master mentors and facilitators for guidance and managements of the centre by CGBMT.

6.5.2 Product diversification: CGBMT has its own set up and has been developing prototypes and database on a variety of bamboo products by architects and designers along with trained artisans and students of various courses. The Center is specializing in bamboo buildings, furniture making, bamboo crafts, bamboo packaging cases and other bamboo value added products. Similarly, CGBMT has tied up with other design organizations and offices to encourage product diversification to cater a wide range of the market demand. The students undergoing Skill Development Programs are exposed to this diversification and are further encouraged to take part in it.

6.5.3 Linkages and market tie-ups: CGBMT is working with various government departments and development institutions, and providing technical services such as capacity building, constructions, sale of products and furniture etc. CGBMT also helps government and other organizations to formulate large projects for the bamboo sector in areas like building construction, treatment, plantations, energy, textile, life style products etc. to generate large number of quality jobs at all levels in the sector. Local market tie-ups also are encouraged to be established to promote sale of bamboo products and crafts at the local level.

In CGBMT's approach, skill upgrading does not end with the training but extends to handholding the artisans through the teething period. Regular follow-ups and visits by the trainers and experts on regular basis is envisaged to ensure monitoring of the new entrepreneurs.

6.6 A Systems approach for Skill Development of Bamboo sector.

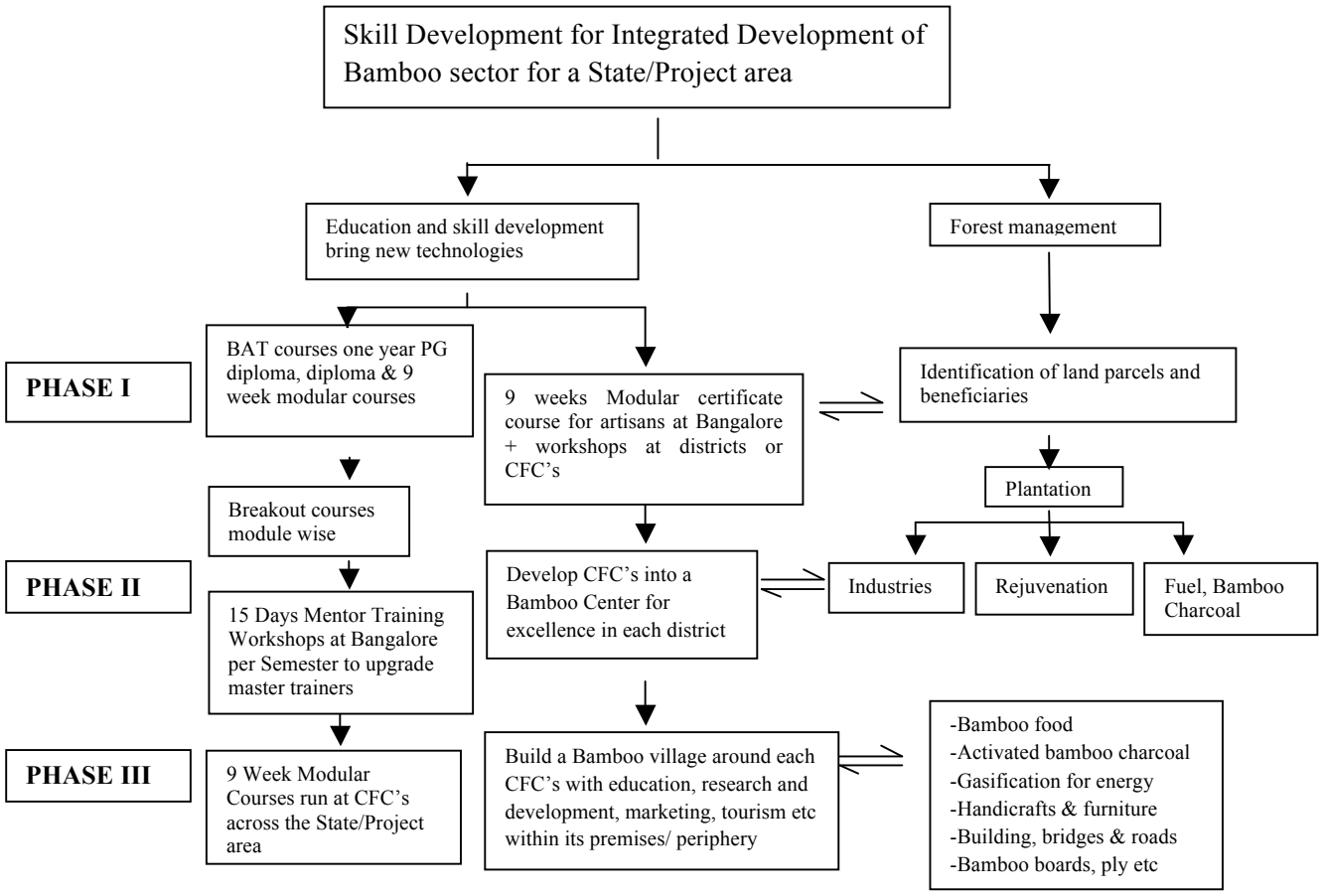


Figure 5:

7. Bamboo Application Technology courses by CGBMT

CGBMT has developed different types of courses in Bamboo Application Technology for different levels of education and eligibility of the candidate. The eligibility starts from 7th standard class to UG level students (Figure 6):

7.1 Types of Courses:

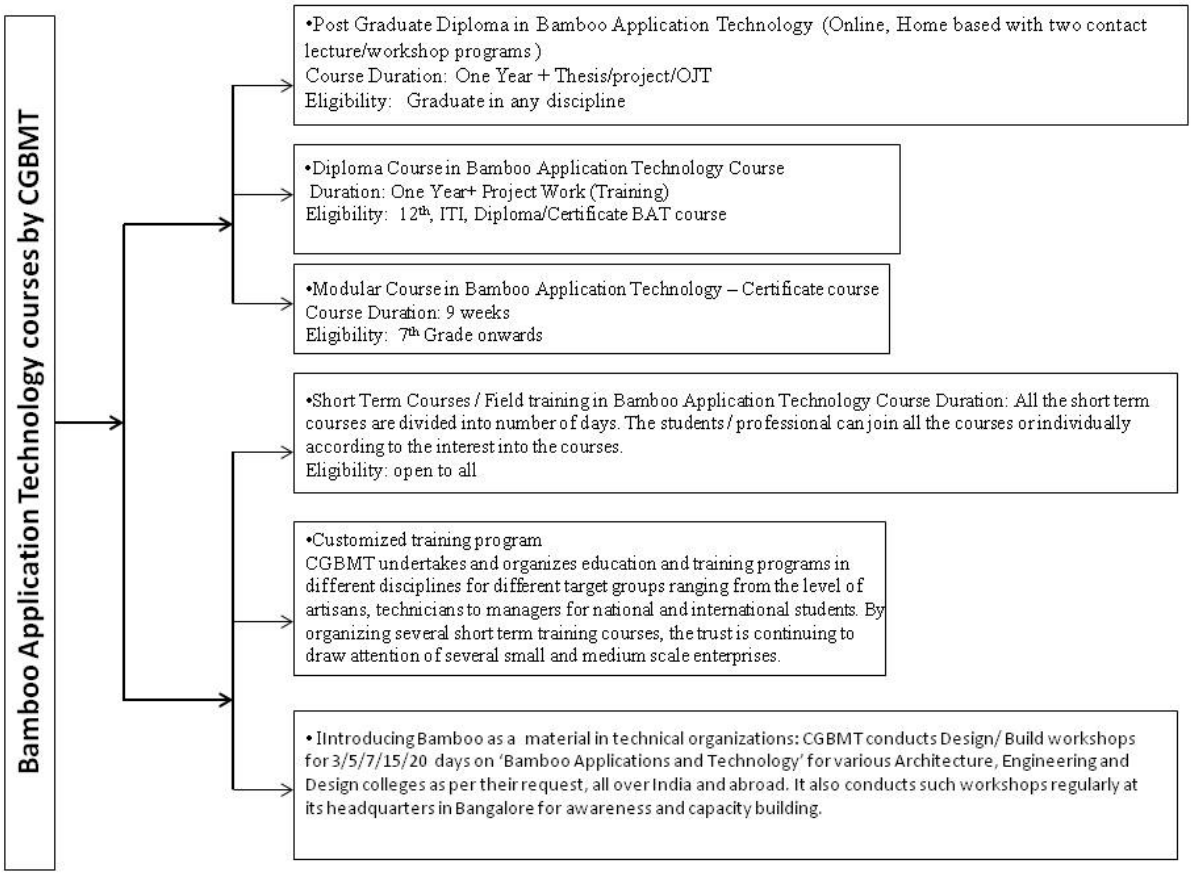


Figure 6:

All the Skill Development programs focus on the following six areas of the Bamboo sector:

1. Bamboo Propagation & Plantation
2. Bamboo Treatment and Jointing
3. Bamboo Handicrafts and Furniture
4. Bamboo in Structure and Buildings
5. Bamboo based Industries
6. Disaster Management with Bamboo

Image 10:

Image 11:

Theme: Community and Economic Development

Image 12:

Image 13:

Image 14:

Image 15:

Image 16:

Image 17:

7.2 Mentor Training programs for the courses for various states/organizations etc

Mentor and facilitator training forms a very important part of the running of all the programs and courses and is done in the following stages:

7.2.1 The first training program is for 9 weeks at CGBMT 's center at Bangalore to train the master trainers, mentors and facilitators for the courses.

7.2.2 These trained artisans can be the mentors, facilitators and trainers for running courses at various Centers/CFC's in the states/organization in the next phase and can also manage the centers.

7.2.3 From second cycle onwards 15 days Mentor Training Program are held at CGBMT, Bangalore every semester to continuously upgrade the knowledge and skill of the mentors, facilitators, and trainers, who in turn train other artisans at various locations in the state.

7.2.4 This model can be further replicated in each state forming a network of study centers/CFC's across the country. The courses can be customized for each state depending on the species of bamboo available, climate, traditional technologies available , culture , market etc of the state.

7.2.5 All of the above courses can be integrated in the mainstream curriculum through a university/ organization, starting at the lowest level , so that at every level a student can exit and still be employable at that particular level. After gaining experience in the market he can again join for the next level courses and upgrade himself by joining either as a fulltime or part time student as per his convenience.

8. Methodology and Execution of Programs- The Collaboration model:

CGBMT understands that skill development of this quality and scale cannot be done by a single organization. Hence it is working towards various models of collaboration to form a network of organizations throughout the country and abroad to run the programs effectively. Some of the models are as under:

8.1 Tripartite agreement:

A University or organization and CGBMT can sign a tripartite agreement with Government body/State Bamboo Missions for the skill development program to impart training to the artisans on a continuous basis. The three parties can share the responsibilities as follows:

University/organization-The Administrator: The university can provide the administrative infrastructure and facilities for running the courses on a continuous basis from its study centers.

CGBMT-The Knowledge provider: To develop the course and course content, provide mentor and facilitator training and provide all technical support for running the courses.

State Bamboo Mission/organization-The facilitator and Financier: To provide students for the course through its various depts., facilitate and finance the courses to be run; and create employment and enterprise for the benefit of the bamboo sector of the state.

CGBMT will study the state/region/project area in terms of demographics and resource availability, climate, market linkages etc to tailor the course and its strategies for the training program in of the state. CGBMT will coordinate with other organizations and NGO's in the state for selection of target members who are involved in the traditional bamboo sectors. These can become mentors to conduct training program at various locations in the states/region/project area.

In this way in five years, the state will have sufficiently trained workforce at each level and can spread the model throughout the state in a sustainable manner without outside help.

8.2 MoU with ITI, polytechnic institutions:

To ensure good quality buildings and products in the bamboo sector, excellent supervisors are a must. Hence CGBMT is trying to work with these organization to introduce our courses at Diploma level with appropriate customization and approval from the technical bodies.

8.3 MoU with technical Institutions:

CGBMT is trying to introduce bamboo and its technologies in the curriculum of various architecture, engineering and design institutions. CGBMT can sign MoU with the institute to design the syllabus, course material and content development, practicals and training programs and help setting workshops etc. This will ensure people in the upper segment of the bamboo sector at the design level.

9. Collaboration with Dayalbagh Educational Institute (DEI)

CGBMT had approached Dayalbagh University for collaboration in 2005 and also constructed a prototype shelter in bamboo for proof of concept for the performance of the material. We signed an agreement in 2014 with the university for running the modular bamboo courses in the state of Madhya Pradesh. We are planning to sign similar agreement with the university for Skill development of Bamboo sector of some other states like Gujarat, Assam, Meghalaya, etc.

Image 18:

9.1 The Dayalbagh Model of Skill Development

The hundred year old legacy of educational initiatives by DEI started in the year 1917 at Dayalbagh, Agra (India) when majority of youth in the country had very limited opportunities for education and skill training. In the course of time, it evolved into the Dayalbagh Educational Policy (1975) and establishment of University (DEI) in the year 1981. Compulsory Core Courses like Rural Development and Agricultural Operations and skill-based work-experience programs related to the major courses of study at under-graduate program level are two of the outstanding features of the DEI. Simultaneously, it became the unique and only Institution of higher education which caters under one umbrella to education right from primary, secondary, tertiary and higher levels in a holistic manner. The Institution allows mobility between formal and vocational streams of education and employability with a network of Centers conducting short duration, focused, modular programs across sectors and the country to bridge skill gap and provide trained manpower to various service sectors in

India. Recognizing the high demand for skill training in the country, the Govt. of India's Cabinet Committee on Skill Development in its meeting held on 19th December 2013, had decided to establish the National Skill Qualification Framework (NSQF). The various Vocational Programs of DEI are in consonance with the requirements of NSQF.

9.2 9- week module on Bamboo Application Technology in collaboration with CGBMT and MP State Bamboo Mission

Keeping the above objectives in view, DEI launched a 9-week modular course on BAT on January 1, 2014 to generate a workforce for the bamboo sector, i.e. bamboo-based building, furniture, handicrafts, and bamboo-based industries. To extend the educational and training facilities to the tribal artisans in the forests of Madhya Pradesh State, a tripartite Memorandum of Understanding (MoU) was signed by the university with MP State Bamboo Mission (MPBSM) and CGBMT, Bangalore. It fosters resources development between the three Institutions, not only for promoting academic and technological interactions, but also for skill upgradation of rural communities to achieve the goal of Bamboo-based development. More than 100 artisans were trained through this programme. Other modules are being developed and a sustainable training programme will continue to produce trained personnel.

9.3 Bamboo Centers of Dayalbagh University

Dayalbagh University , in its commitment towards skill development in the bamboo sector is setting up Bamboo centers at various locations.

9.3.1 Dayalbagh Bamboo Center

It is being set up in a 1.15 acre site in the university campus at Dayalbagh with approximately 16,000-20,000 sq.ft of built up area with classrooms, lecture theater, library, tissue culture lab, workshop, plantations of various species etc (Figure 10).

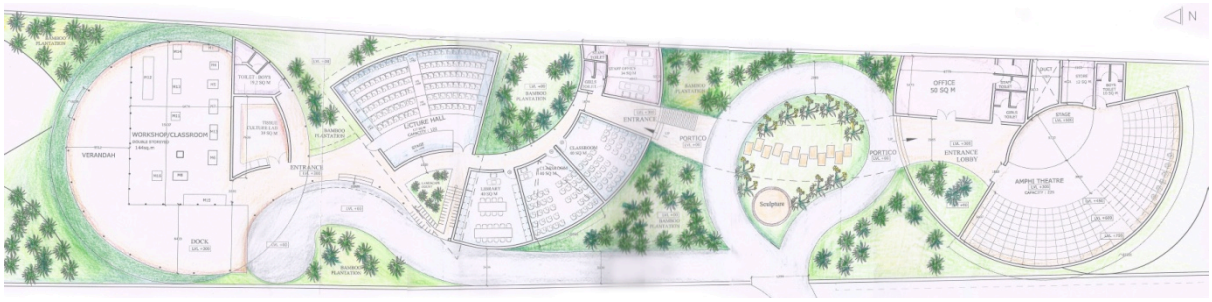


Image 19:

9.3.2 Rajaborari Bamboo Center

The university is planning to have its main bamboo center at a 8000 acre Rajaborari Forest Estate in Harda dist of Madhya Pradesh in a sprawling campus, where it has been running educational institutions at different levels since 1935 and has an ICT center with Edusat facilities.

9.3.3 DEI-DEC Study centers in India

Dayalbagh University has over 90 study centers in India and abroad through which it runs its distance education and vocational training programs to reach the most marginalized sections of the society. In Madhya Pradesh we are running the bamboo courses from its six centers. It is planning to run this course through its study centers in other states with bamboo resources very soon.

10. Collaborations with other organizations

10.1 CGBMT signed an MoU with School of Planning and Architecture, Bhopal in 2014 for introducing bamboo in their curriculum of UG and PG programs. CGBMT is working on the syllabus and course content development for the institute.

10.2 Resource organizations

For running our BAT courses for skill development we have collaborated with various eminent organizations of the bamboo sector as our resource organizations. We organize student visits to these organizations for lectures, demonstrations, practical and hands on workshops and in reciprocation work as their resource organization on mutual benefit basis. To name a few Indian Plywood Industrial Research and Training Institute, Bangalore, Indian Wood Science Institute, Bangalore, Grow more Biotech pvt ltd, Pointech pvt ltd, National Institute of Design, etc. CGBMT has also networked several individual experts in the field as resource persons for its skill development programs.

11. CGBMT's Sustainability Institute at Bangalore

CGBMT is planning a Sustainability substitute on a 5 Acre fully residential campus near the Bangalore International Airport. It is expected to become operational in the next 2-3 years. The institute will provide education, research and development on all aspects of sustainability, bamboo being one of the major focus areas . All the above courses will be run from this campus with the present center catering as its city office.

12. Epilogue

Bamboo can become the vehicle of Integrated Sustainable Development for most of the marginalized bamboo based communities of the world, who are generally treated as untouchables even among the marginalized, through sensitively designed structured and customized skill development and up gradation programs for various levels. These programs will bring a Bamboo Revolution - The Green Gold Revolution in the lives of the rural and tribal populace and make bamboo sector become one of the key economy drivers of the global economy.

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