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A Review - Bamboo Industry

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Abstract: ***The article highlights bamboo as a versatile material with numerous applications across various industries. Its widespread availability, rapid growth, and favorable physical and chemical properties make it a convenient and easily accessible resource globally. Bamboo, being one of the oldest traditional building materials, has a rich history of use in construction.***
Bamboo belongs to the grass family and is renowned for being the fastest-growing plant in the world. Its industrial applications span a wide range, including food production, wood substitute, pulp and paper production, medicinal products, cottage industries, and charcoal production
The Indian bamboo market is anticipated to experience significant growth in the forecast period. The increasing demand for furniture, driven by the rise in per capita income among consumers in the country, is expected to contribute to the market's expansion. Bamboo's ability to thrive on otherwise marginal lands makes it a profitable crop for cultivation in degraded areas. Additionally, its rapid growth makes bamboo an effective tool for climate change mitigation and carbon sequestration, with the capacity to absorb substantial amounts of carbon per hectare. In summary, the article underscores bamboo's potential as a sustainable and environmentally friendly material with diverse applications across industries. It also emphasizes its role in addressing climate change and contributing to carbon sequestration, positioning bamboo as a valuable resource for both economic and ecological purposes
Keywords: Bamboo, Low-cost housing, Bamboo furniture, Structure, strength, species, genera, farming, small scale industry.

I. INTRODUCTION (PRESENT THEORIES & PRACTICES)

In a world that increasingly values sustainability and eco-friendly solutions, the emergence of bamboo as a versatile and renewable resource has opened doors to innovative opportunities across various industries. "Bamboo Industries" is a visionary project that explores the vast potential of bamboo as a sustainable alternative, aiming to revolutionize manufacturing, construction, and various sectors.

This synopsis offers a glimpse into the promising venture that seeks to harness the incredible attributes of bamboo to drive economic growth, environmental conservation, and socialdevelopment.

In this project, we focus on the cultivation of bamboo, its growth, various types, and their applications in industries such as furniture, medicine, housing, and textiles. We also explore sustainable development practices, providing a new income source for farmers.

The project involves conducting a market survey, preparing charts, and performing tests on bamboo using a universal testing machine or compressive testing machine. Finally, we aim to promote our findings on the internet using platforms like blogger.com, demonstrating the entire process from growing bamboo tomanufacturing various bamboo products.

II. LITERATURE REVIEW

A. Bamboo as a sustainable Material for interiors with its potential and market assessment By JETIR (Journal of emerging technologies and innovative Research) By Priyanka Shukla, Dr Mahendra Joshi .

From the above literature review, we analyzed that bamboo is one of the most eco- friendlyresources available. It has a wide range of uses, from building construction to fabric making, and plays a vital role in boosting the economy of many countries. Additionally, we found that many researchers have demonstrated bamboo's good tensile strength, comparable to steel, making it a potential replacement for traditional timber. Life cycle assessment tests have beenconducted to support this theory

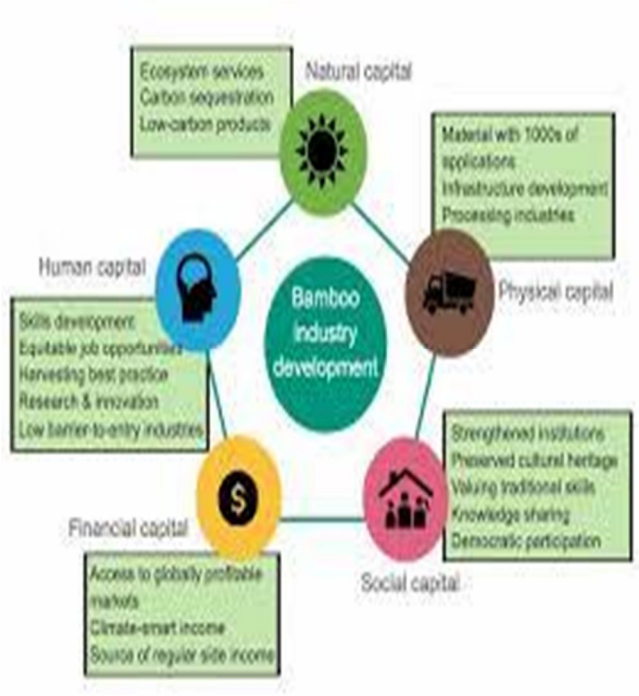
In some Asian countries, bamboo has been widely accepted, and these nations have positioned themselves as major bamboo producers and developers globally. However, in countries like India, which is also a significant bamboo producer on global scale, the bamboo industry is not well-developed. Artisans and cultivators in India continue to face challenges due to inadequate legislative policies, resources, and facilities. It is evident that there is a substantial gap in the development chain of bamboo

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B. Role of bamboo in Sustainable developement by Dipinte gupta & Rajv Ranjan

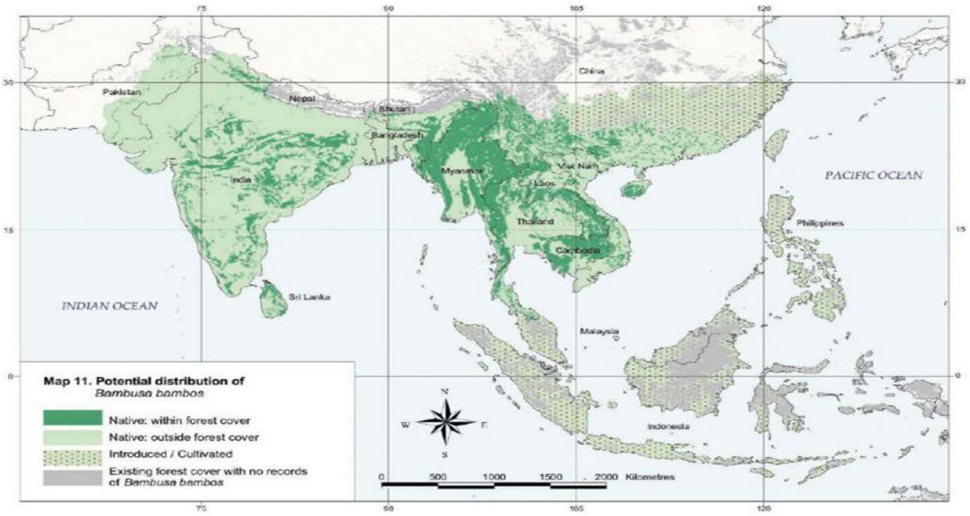
Bamboo, one of the fastest growing plants on earth is a member of family Poaceae and subfamily Bambusoideae. Bamboo is popularly known as "Green Gold of the forest" because of its varied applications. Absence of woody xylem and secondary growth, thehollow inter nodal region of a stem, scattered vascular bundle characterize bamboo as monocot plant. Bamboo found to have 75 genera and 1250 species respectively in the world, among which 23 genera and 75 species respectively exists in India . India is the second richest and largest country in bamboo resources after China. Though India has the largest area under bamboo, which is estimated around 9.6 million hectares, the yield per ha is estimated around 0.4 tons, which is very low in comparison to other countries like China, Malaysia, Costa Rica etc. By looking towards the practical aspects bamboo is a highly economic important plant having versatile uses. The present review gives information about the versatility and verity in pattern of distribution and uses of Bamboo.



C. Case study on bamboo farming 2023 by National institute of agriculturalextension.management (MANAGE)

Bamboo based industries provide employment to number of artists, labour and experts. The bamboo product need special designers because working on wood is different than working on bamboo.

After, the bamboos are harvested, and reach the furniture or the crafts unit, it involves a number of artisans and labour in treatment, production, designing and marketing of the bamboo product. The cycle of economy grows bigger and bigger with the value addition of bamboo. Each stage of bamboo involves a new value chain member hence increasing the beneficiaries



D. Economic, Soical and environmental assessment For of bamboo for infrastructure development. by Akwada, D. R. , Akinlabi , E.T .

Strengths, Weaknesses, Opportunities, and Threats Analysis of Bamboo .There is no such thing as a perfect biomass crop. Each crop, including bamboo, has its specific properties that make it suitable for particular circumstances. Hereafter, bamboo is studied for its strengths, weaknesses, opportunities, and risks coming in future respectively taken into account by future biomass project developers.



E. Study on creative design of bamboo furniture from perspective of economical design By Weixia Gao school of art and engineering, china .

Material selection plays a difficult and hectic role in the ecological and eco-friendly design process, it directly influencing the design, manufacturing process, quality, and the overall life cycle of a product etc respectively. Bamboo, recognized as an environment friendly material since old times, has been largely appreciated. Traditional bamboo furniture, including chairs and stools, continues to be in use now-days. However, the current field of bamboo furniture design often lacks ecological and sustainable design respectively. The prevailing trend involves the direct utilization of traditional bamboo, with limited exploration and changes into other aspects of ecological and environmental design.

F. Structural Use of bamboo by David J A Trujiilo, Sebastian Kaminski –

To study Basic Properties of bamboos used structurally dry density: 500kg / (m ^ 3) - 800kg / (m ^ 3), culm heights: 6m - 25m, nodal spacing 250mm - 500mm, diameters 50mm - 200mm , elastic modulus E - 7000N / mm ^ 2 - 17000N / mm ^ 2, wall thickness = 10% externaldiameter. And various properties Fire Consideration, Behaviour in earth quack, Suitable structural species.



G. Bamboo as a construction building material by Sharma, K dhanwantri, S Mehta Amity School of architecture and planning Amity University Haryand-

Bamboo in Domestic Housing and Small Buildings focusing elemnts like foundation. Flooring ,Walls ,Roofing ,Scaffolding , Advantages and disadvantages of bamboo. Since time immemorial, bamboo has played a crucial role in the development of mankind. It is utilized for a wide range of day-to-day purposes, both as a woody material and as a food source. Bamboo has been the backbone of much of the world's rural life and will continue to be so as the population increases. The top-grade building properties and increased availability of bamboo in our country make it feasible to extensively use bamboo in the field of construction. Its high-value utilization not only promotes economic development but also conserves forest resources, serving as a wood substitute to protect our ecological environment As an economic building material, bamboo's productivity rate and annual harvest cycle surpass any other naturally growing resource. If you plant three or four structural bamboo plants today, in four or five years, you will have mature clumps. In a decade of years, we will have enough mature material to build a comfortable, low-cost house.



H. Medicinal Importance of bamboo. by Rahul Shukla From Amity university.

Including Lifespan of bamboo- 20 years ,Contribution of Fiber into bamboo weight- 60 to 70 %, Action and Use- Drug manufacturing for Humans and cattle ,Bamboo Medicines- Skin care, Salts etc



I. Status of Bamboo in India. By Salil Tewari, R. Kaushal, Harshita Negi

Each acre of bamboo can consume up to 40 tons of CO2 . It is estimated that a 1,000 sq. ft. green home built by bamboo has over 15 tons of CO2 locked up (sequestered) within its fibers. India is much effective region for bamboo cultivation most of its Assam and Arunachal region also the southern states even in Maharashtra and Odisha. Mainly Bamboo Find at the sea level of 770-1080 meter even in each tropical region contains different types of bamboo according to their rainfall cycle, generally . Bamboo prefers high rainfall of about 1200 mm to 6350 mm. In India we find 96 species are native and 40 is considered as cultivated

Table 1: State wise bamboo density in recorded forest area

State/UT	Pure bamboo	Dense	Scattered	Bamboo present but clumps completely hacked	Re-genera-tion crop	No bamboo	RFA (sq km)
Andhra Pradesh	16	3,111	3,485	142	824	29,680	37,258
Arunachal Pradesh	137	5,358	9,558	34	38	36,282	51,407
Assam	41	1,543	7,244	102	25	17,877	26,832
Bihar	0	126	809	24	45	5,873	6,877
Chhattisgarh	11	2,005	6,010	933	2,101	48,712	59,772
Goa	0	66	279	12	25	843	1,225
Gujarat	1	1,103	1,840	176	424	18,103	21,647
Haryana	0	0	21	0	0	1,538	1,559
Himachal Pradesh	0	120	307	3	110	36,493	37,033
Jharkhand	5	684	2,769	259	753	19,135	23,605
Karnataka	3	2,821	4,393	282	2,943	27,842	38,284
Kerala	11	757	1,972	123	621	7,825	11,309
Madhya Pradesh	56	4,581	9,256	1,714	2,560	76,522	94,689
Maharashtra	51	3,911	7,951	1,389	2,625	45,652	61,579
Manipur	95	2,790	7,676	59	67	6,731	17,418
Meghalaya	47	2,035	3,816	21	24	3,553	9,496
Mizoram	35	922	2,287	16	7	2,374	5,641
Nagaland	57	1,669	4,196	30	73	2,598	8,623
Odisha	26	2,918	7,035	584	1,546	49,095	61,204
Punjab	0	6	28	0	10	3,040	3,084
Rajasthan	0	415	1,326	24	211	30,761	32,737
Sikkim	0	214	339	0	0	5,288	5,841
Tamil Nadu	23	718	2,265	163	985	18,723	22,877
Telangana	3	1,647	2,068	67	993	22,126	26,904
Tripura	19	545	3,018	4	31	2,677	6,294
Uttar Pradesh	1	145	620	43	127	15,646	16,582
Uttarakhand	0	190	470	17	401	36,922	38,000
West Bengal	0	92	349	261	240	10,937	11,879
Dadra & Nagar Haveli	0	11	24	3	20	146	204
Total	638	40,503	91,411	6,485	17,829	582,994	739,860

III. CONCLUSION

In conclusion, the Bamboo Industries project represents a promising venture with the potential to revolutionize various sectors by harnessing the remarkable properties of bamboo. With a focus on sustainability, innovation, and economic growth, this project aims to drive positive change in industries ranging from construction and manufacturing to environmental conservation and beyond. By leveraging bamboo's versatility, rapid growth, and eco-friendly attributes, Bamboo Industries not only promises to create new business opportunities but also to contribute to a greener and more sustainable future for our planet. As weembark on this exciting journey, we invite stakeholders and partners to join usin shaping a brighter, bamboo-powered world. Together, we can build a sustainable future while promoting economic development and environmental preservation .

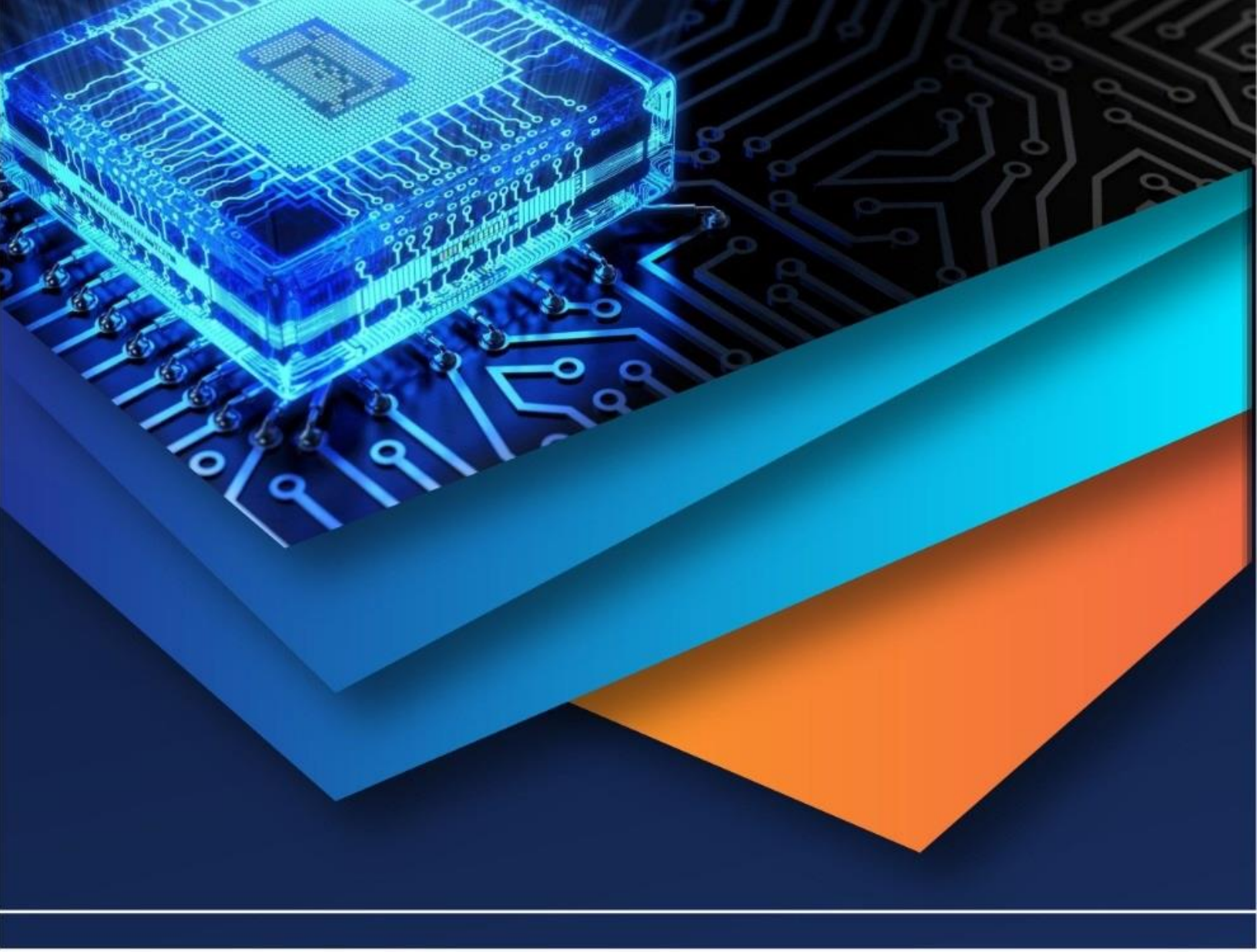
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