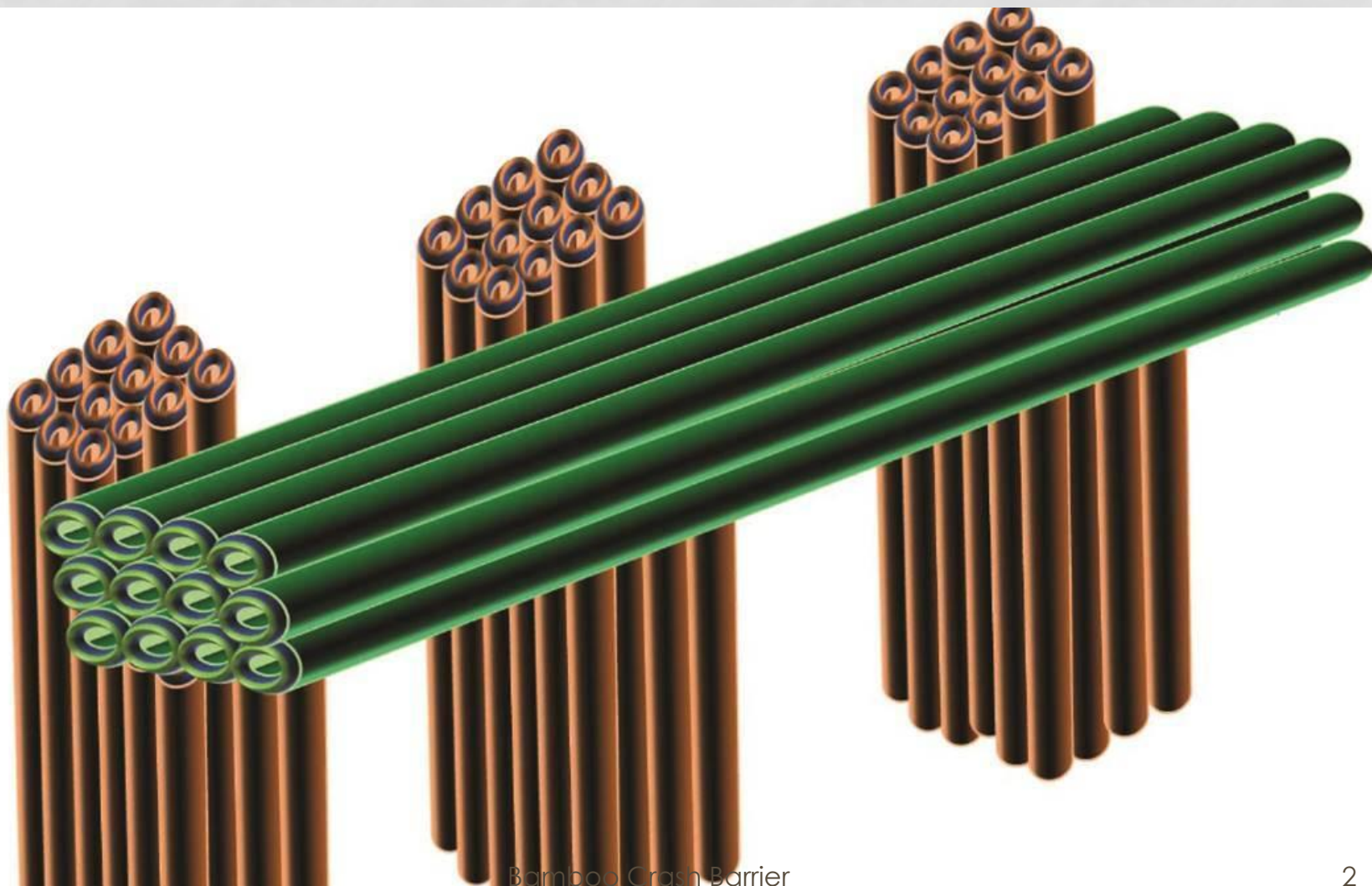


BAMBOO CRASH BARRIER

A COST EFFECTIVE SOLUTION

1



About Crash Barriers

- Crash barriers are typically meant to prevent vehicles from going off highways and should there be an accident, the barrier will cushion the impact and minimise the chance of fatality to the extent possible.
- Installing crash barriers worth Rs 25,000 crore per year in highway projects.
- Around **5 per cent of the cost** of the entire bouquet of work involved in making India's highways go into road furniture.
- Conventional crash barriers made of metal and alloy may cost around Rs 2,000 per metre.

Problem Statement

- Accidental deaths on highways because of getting crashed into barriers. Because of hardness of Steel or Concrete barriers (which are commonly used), body of a person gets damaged seriously after hitting it.
- Existing crash barriers available in market are costlier, and because of which many of times road construction companies does not install them.

POTENTIAL SOLUTIONS :

There are several types of barriers we can use

- 1) Roller barriers
- 2) Flexible barriers
- 3) polymer based barriers
- 4) Semi-rigid barriers
- 5) Bamboo crash barriers

TARGET SOLUTION :

Target solution is to develop crash barriers which is made up of bamboos. Specifically Beema bamboo which is strong, durable, fast-growing, Cheap and tall clone of traditional bamboo.

SOLUTION POTENTIAL AREAS :

We can define solution potential areas on basis of maximum speed crash barrier can bear. Bamboo crash barrier can be suitable for vehicles with speed less than 100kmph. In India,

max speed limit on national highways: 100kmph
max speed limit for urban roads : 70kmph

Bamboo crash barriers can be used in these roads. Along with this bamboo crash barriers can be used in rural area roads and also in internal city roads.

Apart from crash barriers, Beema bamboo is recommended for

- Large scale plantation
- Energy plantation for power generations
- Homestead garden planting
- Large reforestation programs
- Land reclamation in mines, sodic soils, water logged areas etc.

Limitations:

Bamboo crash barriers cannot be used in expressways, because speed limit of expressways in India is 120kmph(which is more than permissible limit).

Business Model Canvas

Designed for:

Bamboo crash barriers

Designed by:

Date:

20/10/21

Version:

Key Partners

- Bamboo suppliers
- Coir suppliers
- Logistics and transportations
- Management consultancy
- Tax consultancy
- Contractors
- Banks

Key Activities

- Acquisition of high potential new employee
- Increasing personal interest of employees to search for new potential design and technical solution for product and production
- Encouraging employees to constantly have there eyes open for potential improvement
- Regular quality meetings
- Acquisition of best bamboo suppliers
- Purchase department is highly responsible for the quality of supplier
- Direct contact to bamboo suppliers
- Implementing brand symbol on bamboo
- Participating exhibition in a proper size and quality to raise the brand image

Key Resources

- High quality employees ,technicians ,web page
- creativity and taste for design to invent new technical solution and product
- software for management and controlling
- high quality supply chain
- stable and save process
- patents

Value Propositions

- Fire resistance
- highly flexible
- highly durable
- light weight
- high compressive strength
- cost effective

Customer Relationships

- highly quantitative consultation for whole project
- holding promises from bamboo suppliers
- professional and helpful argumentation
- fair offers

Customer Segments

- government contractors
- private contractors

Channels

- web page
- social media
- exhibitions
- advertisement

Cost Structure

- marketing
- transportation
- machines , software and computers
- maintenance cost
- print media
- insurance

Revenue Streams

- customer pay for quality of the product and consultant as well as for the brand reputation, individuality and flexibility
- prices are structure according to different pattern of design
- extra charge for the other value added service

About Beema Bamboo

Beema or Bheema bamboo is a type of bamboo engineered to be a stronger, fast-growing and tall clone of the traditional bamboo found in the Indian subcontinent, especially the North-East. This variety grows well in southern India also.

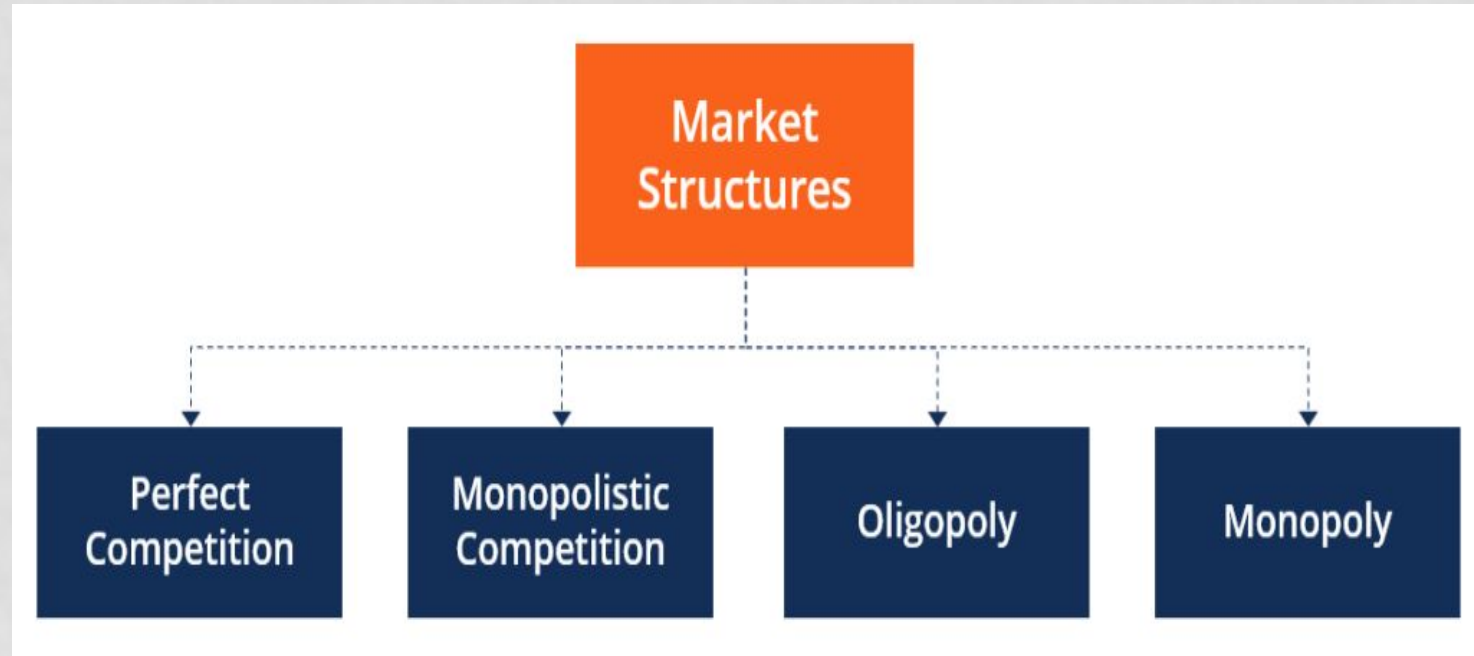
- This cloned Bamboo is a superior clone, a higher Biomass yielding Bamboo species.
- It is thorn less, sterile, fast growing and High yielding superior bamboo.

If it is managed as per the Silvicultural methods it will higher Biomass on sustainable basis. Soil, water requirement and climatic conditions are similar as sugarcane crop.

- Beema Bamboo acts as a Carbon Sink and absorbs excess Carbon-di-oxide in the air three to four times than other trees.
- Obviously, it is eco-friendly and absorbs 400 to 500 Kg Carbon-di-oxide every year and grows five times faster than other species of Bamboo.

Market Structure

Market structure refers to how different industries are classified and differentiated based on their degree and nature of competition for goods and services. It is based on the characteristics that influence the behaviour and outcomes of companies working in a specific market.



In our case since the concept bamboos crash barrier is new and limited the type of market structure shall be Oligopoly where small no of companies shall sell / compete for similar product.

An oligopoly market consists of a small number of large companies that sell differentiated or identical products. Since there are few players in the market, their competitive strategies are dependent on each other.

As the business grows it is expected to go in Perfect Competition.

Perfect competition occurs when there is a large number of small companies competing against each other. They sell similar products (homogeneous), lack price influence over the commodities, and are free to enter or exit the market.

Consumers in this type of market have full knowledge of the goods being sold. They are aware of the prices charged on them and the product branding.

SWOT Analysis

Strength:

- Government in search of alternatives of existing crash barrier used
- Demand will be high once product gets enough marketing.
- Bamboo are hard and durable
- Labor cost is low
- Available government policy and strategies.
- Appropriate techniques/equipment and basic skills available.
- Appropriate techniques/equipment and basic skills available.
- Public Investment in development and dissemination of new technology.

Weakness:

- Struggling to meet deadlines - if work too much
- Holding too much stock can be problematic.
- Quality of material will degrade if stored for too much days.
- Product is bulky and transportation cost is high.

Opportunity:

- Good amount of capital can be obtained through Government schemes for MSME's.
- Similar products in markets like steel or any other metal crash barriers are more costlier.

Threats:

- Competitors with similar products will be there, some of them will be selling product at cheap price.
- Competitors launching advertising camp.
- Established players like China & Taiwan.
- Poor treatment procedures may lead to loss.
- Wastage of raw material during processing may lead to loss.

Financial Projections:

1. The Project is pilot project and for new highway construction purely for supplying, providing and erection of Bamboo Crash Barrier.
2. The target production is for 50,000 metre i.e. 50 kms per year and minimum production to achieve break even in two years
-pessimistic condition is 15 kms of supply and erection of Bamboo crash Barrier each year .
3. The workshop and office is considered to be of 5000 sq.ft.
4. 70% of Fund required shall be raised by MSME loans provided by Government of India under Udaymitra Scheme and 3 Lakhs from each group member of 8 or get a Capita Investor as explained in option -2 of capital arrangement.

COST ANALYSIS

Raw Material Cost Analysis

Case 1 Cost Analysis for Purely Bamboo Railing Erection - Pilot Project

No	Description	Quantity	Unit	Rate	Amount
				Rs	Rs
1	Bamboo for 3 metre railing				
	V1 - 1x9 x7 + H1 & H2 -2x 3m x 9	240.12	feet	2.50	600
	Coir 10% of Bamboo				60
A				Subtotal	660
	Labour - 25% of A				165
				Total cost of Railing for 3 m	825
Supply & Erection Cost of Only Bamboo Railing per running metre					275

Set up Details

Item	Fixed cost (monthly)		Total Cost/Yr
	Rs	Rs	Rs
Workshop + office lease	50,000		600,000
Electricity	8,333		100,000
Licencing	2,500		30,000
	A	Sub Total	730,000
Equipment	One-time cost(Purchase)		Total Cost/Yr
Machine	Cutting Machine Assembling desk 2 nos	300,000	300,000
Computers	3 computers	150,000	150,000
Sensors		25,000	25,000
Security Cameras	10 camera & NVR	75,000	75,000
Office Equipment	Tables ,chairs & Cupboards	200,000	200,000
AC		100,000	100,000
Security Access Equipment		10,000	10,000
Servers		100,000	100,000
Production Tools		75,000	75,000
Material Storage		100,000	100,000
Special Software		50,000	50,000
	B	Sub Total	1,185,000
	Fixed Asset One time Cost	Total A + B	1,915,000
	Considering life span of 4 years		
	Fixed Cost per year for Balance sheet distributing for 4 years		478,750

Expenses 1

		Cost/Unit	unit	Units/Yr	unit		Total Cost/Yr
	Considering production of 50,000 metre per year						
A	Capital Cost						
	Raw materials & erection refer costing	275	per metre	50,000	m		13,756,875
	Miscellaneous supplies	5	per metre	50,000	m		250,000
	Special Materials	5	per metre	50,000	m		250,000
	Packing materials	3	per metre	50,000	m		150,000
	Logistic & transportation	20	per metre	50,000	m		1,000,000
					A	Sub Total	15,406,875

Expenses - 2

B	Production - HR Variable Costs	Variable Costs		Fixed Costs		
		Months	Cost/Mont h	One-Time/Yr	Numbers	Total Cost/Yr
	Production floor workers		15,000		10	1,800,000
	Maintenance team		15,000		2	360,000
	Quality specialists		20,000		1	240,000
	Consultants		5,000		1	60,000
	Security guards		15,000		2	360,000
	Sanitation staff		13,000		1	156,000
	Emp state insurance registration (4.5%) monthly					133,920
				B	Sub Total	3,109,920

Expenses - 3

	Sales & Mktg Variable Costs	Variable Costs			Fixed Costs		
		Months		Cost/Month	One-Time/Yr	Numbers	Total Cost/Yr
	Salesperson salaries & wages			15,000		3	540,000
	Commissions /bonus			5,000		3	180,000
	Benefits						-
	Promotional materials			10,000		1	120,000
	Advertisement campaigns			25,000		1	300,000
	Marketing agency commission			3,000		1	36,000
	Print media			7,000		1	84,000
	Social & online media			5,000		1	60,000
	Marketing salaries & fees			25,000		2	600,000
					C	Sub Total	1,920,000
D	General Admin	Variable Costs			Fixed Costs		
		Months		Cost/Month	per month	Numbers	Total Cost/Yr
	Security				15000	2	360,000
	Legal				5000	1	60,000
	Office Admin				15000	3	540,000
	Finance & Accounts				15000	2	360,000
	Medical (if reqd)				5000	1	60,000
					D	Sub Total	1,380,000

Expense 4

E	Other Expenses	Months		Cost/Month	per month	Numbers	Total Cost/Yr
	Insurance				25000	1	25,000
	Shipping				8000	1	96,000
	Network Connectivity				1000	1	12,000
					E	Sub Total	133,000
				Running cost per year			21,949,795
				Running cost per metre			439
	Capital required for start up for six months until inflow of revenue starts @ 50%						10,974,898
	Expenses arrangement for production & back office for six months – A to E						10,974,898
				Fixed Asset one time cost			1,915,000
	Capital required for start up to sustain till inflow of revenue for six months						12,889,898
				Total Inivital Investment - first year			23,864,795
	Total expense for second year considering 5% appreciation on running cost						23,047,285
	Total expense for Third year considering 5% appreciation on running cost						24,199,649
	Total expense for Fourth year considering 5% appreciation on running cost						25,409,631

Revenue & Expenses

Revenue				
Period	Selling price / unit	No. of units sold	unit	Total Revenue/Yr
Year 1	550	50,000	metre	27,500,000
Year 2	600	50,000	metre	30,000,000
Year 3	650	50,000	metre	32,500,000
Year 4	700	50,000	metre	35,000,000
Expenses				
Year 1	Capital+ Running cost of full year			23,864,795
Year 2	Running cost of second year	5 % appreciation on first year		23,047,285
Year 3	Running cost of Third year	5 % appreciation on 2nd year		24,199,649
Year 4	Running cost of Fourth year	5 % appreciation on 3rd year		25,409,631

	Net Profit before Tax	1st year		3,635,205	
	Net Profit before Tax	2nd year		6,952,715	
	Net Profit before Tax	3rd year		8,300,351	
	Net Profit before Tax	4th year		9,590,369	
		Profit % first year		15.23	%
		Profit % 2nd year		30.17	%
		Profit % 3rd year		34.30	%
		Profit % 4th year		37.74	%

Capital – option1

No	Amount	Source/comments
	Rs	
1	1,915,000	Total Capital Required for set up
2	10,974,898	Total Capital Required for initial running up to six months till revenue starts getting generated
Capital Required	12,889,898	
Capital arrangement		
3	3,200,000	4 Lakhs from each partner of 8
4	9,625,000	Through Govt Scheme MSME=70 % of order of 25 kms
Capital arrangement	12,825,000	
Since Capital Required<Capital arrangement , Hence OK.		

Capital -2

No	Amount	Source/comments
	Rs	
1	1,915,000	Total Capital Required for set up
2	10,974,898	Total Capital Required for initial running up to six months till revenue starts getting generated
Capital Required	12,889,898	
Capital arrangement		
3	3,200,000	4 Lakhs from each partner of 8
4	5,600,000	Capital partner - Shall receive 35% of net profit earned , no interest to be paid for capital blocked
5	4,125,000	0.30 x550 X25000 - Advance from Client for 50% of target
Capital arrangement	12,925,000	
Since Capital Required<Capital arrangement , Hence OK.		

Revenue & Break Even Analysis

	Revenue				
	Period	Selling price / unit	No. of units sold	unit	Total Revenue/Yr
	Year 1	550	50,000	metre	27,500,000
	Year 2	600	50,000	metre	30,000,000
	Year 3	650	50,000	metre	32,500,000
A	Break even Analysis if target of 50,000 metre per year is meet - Optimistic				
		Expenses for first year			
		Expenses	Fixed set up		1,915,000
		Running	Cost first year		21,949,795
				Total Exp	23,864,795
		Revenue of first year	50,000X550		27,500,000
			Difference		3,635,205

Since difference is positive , Break even will happen in first year only if full target is met

Risk Analysis

	RISK ANALYSIS - FINANCIAL - if 30% order is meet			
B	Break even Analysis - If target of 15000 metre per year is meet - Pessimistic			
	Expenses for first year			
	Expenses	Fixed set up		1,915,000
	Expenses	Running		6,584,939
		Total Exp		8,499,939
	Income of first year			8,250,000
		Difference	-	249,939
	Since difference is negative , Break even will not happen in first year			
	Second Year	15000 metre		
	Running expense - 5 % escalation	1.05X Rs65,84,939		6,914,185
	Income in second year			9,000,000
	Difference Income - expense	15000x Rs600		2,085,815
	Adding loss off first year		-	249,939
		Profit without Tax		1,835,876
	Hence in Pessimistic scenario also break even will happen in second year			

Internal Rate of Return - IRR

Case 1 - Discounting Factor -10 %

Year	Initial Investment	Cash In flow	DF	PV	
			10%		
0		- 23,864,795	1	23,864,795	
1		3,635,205	0.97	3,526,149	
2		6,952,715	0.942	6,549,458	
3		8,300,351	0.915	7,594,821	
4		9,590,369	0.878	8,420,344	
NPV - L				2,225,976	A

Case 2 - Discounting Factor -12 %

Year	Initial Investment	Cash In flow	DF	PV	
			12%		
0	- 23,864,795		1	23,864,795	
1		3,635,205	0.892	3,242,603	
2		6,952,715	0.797	5,541,314	
3		8,300,351	0.711	5,901,550	
4		9,590,369	0.635	6,089,884	
NPV -H				- 3,089,444	B

By
Interpolation

$$\begin{aligned} \text{IRR} &= L + (A/A-B) \times (H-L) \\ &= 10 + (22.59/22.59+30.89) \times (12-10) \end{aligned}$$

IRR 10.84 %

Hence IRR =10.84%

carrier

Technical Risk Analysis –

1. Since its pilot project and of limited target of 50 kms per year , the chances of project failing on firms technical grounds are quite low.
2. The only chance of complete failure is when the government scraps the bamboo crash barrier project due to its technical failure to withstand the impact of fast moving vehicle.
3. The capital at stake at this stage shall be Rs 19 lakhs accounted for set up as all other expenses are accounted post receipt of confirmed order.
4. In that case new avenue such compound bamboo fencing and bamboo decorative furniture works can be started

Market Risk Analysis –

1. Interest Rate Risk is not applicable for capital arrangement² as we are arranging funds from partner on profit basis and not on interest base.
2. For capital arrangement- 1 since its MSME interest rates are nominal and can be managed .
3. Commodity Risk is also low as ample of bamboo is available as per Government schemes.

Future Potential –

1. If the pilot project succeeds and GOI implements Bamboo Crash Barrier work on full scale the future potential are exciting.
2. The future potential of Bamboo in allied field are also good such as compound fencing etc as its economical ,reduce carbon foot print and economical.
3. It also has future potential in decorative and interior industry.

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Thank You