# Project Report

On

**Market study for entering into a new food product line development phase- bamboo shoots.**


Submitted By:

Abhay Khullar

2K11/MBA/01

Under The Guidance of-

Prof. P .K Suri
Head of Department- DSM




Delhi School of Management

Delhi Technological University, Delhi

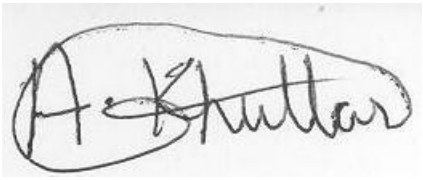
(Formerly Known as Delhi College of Engineering)

Bawana Road, Delhi – 110042

# DECLARATION

I the undersigned solemnly declare that the report of the project work entitled **'New food product line – Bamboo shoot cuisines'**, is based my own work carried out during the course of my study under the supervision of **Prof. P K Suri(Head Of Department – Delhi School Of Management).**

I assert that the statements made and conclusions drawn are an outcome of the project work. I further declare that to the best of my knowledge and belief that the project report does not contain any part of any work which has been submitted for the award of any other degree/diploma/certificate in this Organization or any other Organization.



Abhay Khullar
Roll No.:2K11/MBA/01
Delhi School Of Management
Delhi Technological University
(Formerly Delhi College Of Engineering)

## CERTIFICATE BY GUIDE

This to certify that the dissertation report entitled **'New food product line – Bamboo shoot cuisines'** submitted by the candidate, Abhay Khullar in partial fulfillment of the requirement for the award of **Master of Business Administration by Delhi School Of Management, Delhi Technological University, New Delhi** is a record of the candidate's own work carried out by him under my supervision.The matter embodied in the report is original and has not been submitted for the award of any degree.

Date :

Prof. P.K. Suri

(Head of Department,DSM)

## ACKNOWLEDGEMENTS

I take immense pleasure in thanking **Prof. P K Suri (Head Of Department – Delhi School Of Management)** for having permitted me to carry out this project work.

I wish to express my deep sense of gratitude to **various bamboo shoot vendors and traders** for their able guidance and useful suggestions, which helped me in completing the project work, in time.

Needless to mention that **my mentor** had been a source of inspiration and gave timely guidance in the conduct of my project work.

Words are inadequate in offering my thanks to the online resources for their encouragement and cooperation in carrying out the project work.

Finally, yet importantly, I would like to express my heartfelt thanks to my beloved parents for their blessings and wishes for the successful completion of this project.

**Abhay Khullar**

**Executive Summary –**

Conducting a feasibility study need not be difficult or expensive, but the most important aspects should all be taken into account to ensure that potential problems are addressed. In this report, the following questions that can be answered by a feasibility study are addressed:

| | |
|---|---|
| · is there a demand for the produce? | (Find out the characteristics required of the product and the size and value of the market) |
| · who else is producing similar products? | (Determine the number and type of competitors) |
| · what is needed to make the product? | (Find the availability and cost of staff, equipment, services, raw materials, ingredients and packaging) |
| · what is the cost of producing a product? | (Calculate the capital costs of getting started and the operating costs of production) |
| · what is the likely profit? | (Calculate the difference between the expected income from sales to an estimated share of the market and the costs of production) |

Each of these aspects should be looked at in turn. When all the information has been gathered and analysed, it would be possible to make a decision on whether the proposed investment in the business is worthwhile or whether the producer's money could be better spent doing something else. The same considerations should be taken into account when an existing entrepreneur wishes to diversify production or make a new product.

The advantages of writing down the results of the feasibility study are as follows:

 the findings can be set out in a clear and logical way, so that potential lenders can understand the business and its likely risks/advantages.

 the document helps the entrepreneur to clarify and focus his/her ideas.

 it is reference material that can be used to plan long term development of the business.

 the plan can be regularly consulted and updated as a guide to the business development.

 mistakes can be made on paper rather than in the operation of the business.

 when the plan shows that a successful business is possible, it makes the entrepreneur feel more confident about success.

 it helps the entrepreneur to decide how much money is needed and if properly prepared, it gives the loan agency confidence that their money will be repaid.

Most lenders have little understanding of fruit and vegetable processing and the entrepreneur should therefore write the business plan in a simple way, avoiding jargon and technical language as much as possible. If lenders can understand what is involved in the business, they are more likely to approve a loan.

It is important to include as much detail as possible and if necessary do thorough research first. It is also important to look outwards from the business to judge what competitors will do and how the business will develop to become sustainable.

It is also important to remember that the business plan is a working document that should be used as a framework to guide the development of a business. To do this it should be regularly updated. However, it often happens that an entrepreneur pays an adviser or consultant to prepare a business plan but then does not understand the contents, or having read it once, puts it away on a shelf never to be seen again. In the following parts of this report, the above aspects are described in a systematic way, as should be done in a feasibility study, starting with 'The Market'.

**Overview of Bamboo**

Bamboo is endowed with several features such as fast growth, high total biomass production, low input costs and a capacity to provide yield in 4-5 years. It can provide steady annual returns for over 30 years and has the potential to be the raw material for a variety of industries. It is emerging to be a viable crop.
In India, bamboo, which is traditionally considered the `poor man's wood', and labelled as `green gold' is being considered a major export item by the centre for the global market, valued at about Rs 50,000 crore. The annual turnover of the bamboo sector in the country is estimated to be around Rs 2,500 crore.

Bamboo cultivation can also play a major role in stabilisation of the environmental problems. Deforestation, followed by increased carbon dioxide emission, is one of the major concerns of environmentalists. The cultivation of bamboo as a wood substitute helps to offset depletion of the rain forest. Its rapid growth ensures an effective reconstruction of damaged eco systems as bamboo generates 30 per cent more oxygen than other trees.

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# *Chapter – I*

# *Introduction*

**Report on process, market& business opportunity report on edible bamboo shoot**

In the Bamboo growing areas of the North East of India, Bamboo has been a very significant resource plant in the life of the ethnic populace, its usage extending and visible in every aspect of their existence in this region. Such usage is also observed at every place wherever Bamboo is available as a natural resource.

The consumption of the harvested shoot of Bamboo, as it emerges out of the ground, in various forms, has been more of a necessity rather than a delicacy, for the native population. Traditionally Bamboo Shoot has been a specific to the primary user population in classical regions of natural growth. However, Bamboo management, emerging as an important issue with respect to forests of India in general and more specifically in the North East, has meant a renewed thrust to explore process opportunities for Bamboo Shoot.[Page 6, de cristo(2011)]

Bamboo Shoot is a significant item of consumption in the home. While it is not significant in commercial terms, compared to the volume of business in Bamboo Shoot and derivatives in the Far and South East Asia, it is an item with scope for business development for India.

Bamboo Shoot is not a traditional product in other parts of India than the North East of India and some hilly tracts in Northern and South Western India, so the primary market for the product, at present, is the North Eastern Region. There is also a big demand for Bamboo Shoot as an ingredient in South East Asian and Chinese cuisine. Export, plus a potential India-wide constituency that is presently not aware of this product, constitute the potential markets. Bamboo Shoot business should be examined for the possibility of its development and growth.

Local entrepreneurial talent in the North East has been waiting for an implementable technology. The Bamboo Shoot processing functions that are now suggested for the North East, are mainly focused on the traditional methods of Bamboo Shoot processing. The study was felt necessary to examine the techno-economic viability of such units that may use Bamboo Shoot from an Indian forest source, that is available in the North East of India to which region this study is presently focused.

**As per the quantitative research** –

 **The untapped sector** - In India, the North-East has the largest stock and diversity of bamboos. Next comes the Western Ghats. Though India has the largest area under bamboo, which is estimated at around 9.6 million hectares, the yield per hectare is estimated at around 0.4 tonnes, which is very low compared to other countries such as Japan, China and Malaysia. About 80 per cent of the world's bamboo comes from these countries, while India, though having more than 100 different species of bamboo, has only about 4 per cent share in the global market.[Page 10, de cristo(2011)]

 It is estimated that there are about 7.5 million bamboo artisans dependent on bamboo for their livelihood, according to official statistics. Under the bamboo plantation, surface soil (0 - 20 cm) electrical conductivity and soil pH improves and the soil is enriched with organic matter. Based on the research conducted, bamboo replaces 30 per cent of its biomass in one year, while a tree forest can only replace 3 to 5 per cent. It is also one of the hardiest plants and can yield 20 times more timber than other trees in the same area.

 "Unlike most tropical hardwood species, which take at least 30 years to mature, bamboo shoots and culms (stems) can be harvested at about three to four years after planting," says Dr N. Barathi, Director, Growmore Biotech Ltd, Tamil Nadu.The production can continue for about 20 years or more if properly maintained. While a 60-foot tree cut for market takes about 30-60 years to replace, a 60-foot bamboo takes 50-60 days to replace, according to him. Economically speaking it is remunerative as compared to other trees. The returns are recurrent on annual basis after five to six years for up to 30 years or more, without recurring investment on plantation. For farmers disenchanted with eucalyptus, teak and casuarina, bamboo cultivation is a viable alternative.

 As a woody grass, bamboo is perfectly suited to agro-forestry. It fits amicably in agro-forestry situations such as inter-cropping, soil conservation, and yields value-added products such as timber, livestock forage, shoots, fibre and craft wood.

It is a natural water control barrier. Because of its wide spread root system and large canopy, bamboo greatly reduces rain runoff, prevents massive soil erosion and retains twice the amount of water required for other crops in the water table. Bamboo helps mitigate water pollution due to its high nitrogen consumption, making it a solution for excess nutrient uptake of wastewater from manufacturing, livestock farming and sewage treatment.

• Bamboo is one of the strongest building materials. Bamboo's tensile strength is 28,000 pounds per square inch versus 23,000 pounds per square inch for steel. If an equivalent project used timber, it would require 500 hectares of our diminishing tropical rainforests.

This study meets the following **objectives** :

(A) User Evaluation: A preliminary evaluation of Bamboo Shoot for Indian culinary use, covering representative sections of the urban Indian consumer population. The nutritional qualities of the Bamboo Shoot are also evaluated.

(B) Process & Project Study: The Process study focuses on the processes appropriate for taking Bamboo Shoot from the plant to the standard intermediate forms and packaging for bulk marketing and distribution (suitable for culinary use). The project study includes: evaluation of market data, facility requirements, project costs, operating costs, economics, business sizes, etc., to arrive at appropriate Business Opportunities for Bamboo Shoot.

Two species (***Dendrocalamus hamiltonii & Bambusa pallida***) were available at the time of this study. These were examined for their nutritional qualities. Dendrocalamus hamiltonii was studied for its nutritional qualities, user evaluation, storage, process and packaging studies. Dendrocalamus asper was examined for the process and packaging studies alone, due to the small sample quantity available at this time.

# *Chapter – II*

# *Literature Review*

Although there is no fixed way of writing a plan, the sections that should be included are summarised as follows:

**Introduction:** to summarise what the product is, who is expected to buy it, why the business is a good idea,

**Basic information:** the name and address of the owners, their qualifications and experience,

**The product:** details of the raw materials, the production process, quality assurance, packaging etc. What is special about the product compared to those of competitors,

**The market:** the potential customers, where they are located, the size and value of the market, expected market share, likely expansion (or contraction) of the market, the number and types of competitors, their strengths and weaknesses and their expected reactions to a new product,

**Selling plan:** distribution and sales methods, planned promotion, product cost,

**Premises/equipment:** where the business will be located, building to be used and services that are needed, steps taken to meet health and hygiene laws, equipment and its cost,

**Finance:** amount required for start-up and initial operation, including profit and loss statement and cashflow forecast for three years, owner's resources that will be used, size of loan required and what it is for, security on the loan,

**Business registration:** steps that have been taken or are planned to register the business with tax authorities, local government and Department of Health (or equivalent) for hygiene inspection and certification,

**Future plans:** objectives of the business and expectations for the next 3-5 years.

### Bamboo And Bamboo Shoot [1]

Apart from the diverse use that the various parts of the plant are put to, the tender shoot is consumed as a foodstuff during monsoons, when the fresh culms emerge out of the ground as shoot. There are a number of species, which produce edible shoot at varying periods of availability, during and after the monsoons.

The distribution of Bamboo varieties that produce edible Shoot in NE India, and have been chosen for a detailed study, is shown in Table below:

Distribution of Bamboo Species Producing Edible Shoot in NE India

| Variety | North-Eastern States | | | | | | |
|---|---|---|---|---|---|---|---|
| | Arunachal Pradesh | Assam | Manipur | Meghalaya | Mizoram | Nagaland | Tripura |
| *Bambusa nutans* | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| *Bambusa pallida* | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| *Bambusa polymorpha* | ✓ | ✓ | ✓ | ✓ | | | ✓ |
| *Bambusa tulda* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| *D. brandisii* | | | ✓ | | | | |
| *D. giganteus* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| *D. hamiltonii* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| *D. strictus* | | ✓ | | ✓ | ✓ | | ✓ |
| *Melocanna bambusoides/ (Melocanna baccifera)* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

**Bamboo Shoot Harvesting**

The edible vegetable portions of Bamboo are the young emerging shoots that are harvested before significant fibre development. The shoots are progressively formed from latent buds on rhizomes. There are diverse views on the harvesting of Bamboo Shoot for edible purposes. Some recommend that the Shoot be harvested by digging below the ground and extract the still growing tip. Others wait for the Shoot to emerge from the ground and suggest differing heights and age of the Shoot for harvesting.

**Shoots of clumping Bamboos grow vigorously beneath the soil surface, finally breaking through into the light. At this stage they often pause in their growth. The reason for this is not known. However, exposure to sunlight causes the production of chemicals that are bitter and hastens shoot elongation by stimulating the development of a very woody base. The Bamboo shoots grow between 10 cm (4") to 20 cm (8") under the soil surface. A telltale bulge or cracks in the soil usually reveal the new shoot's location. As new shoots arise from rhizomes which more-or-less radiate outwards from the clump they can be harvested without much disturbance of the surrounding soil.**

In the case where the shoot is harvested by digging it out, digging should be proceeded with care so that shoot are not bruised. Shoot should be dug when the tips are just emerging from the surface of the soil or very soon after that stage. The soil from around the base of the emerging shoot is to be removed, exposing the lower part of the rhizome neck. The last third of the shoot is to be carefully severed with a narrow axe or machete or sharpened narrow-bladed spade. Slope the cut away from the narrow woody neck that connects the new culm with an older one. If the necks remaining in the soil have viable buds, some will produce a Shoot in following seasons.

In the other case, harvesting is done when the Shoot tip first emerges above the soil. The shoot is cut free from the soil and near the base of rhizome. Shoots are cut with a sharp flat blade, wide enough for the diameter of the Shoot. Care is needed to cut through the base of the

**Digging around the Shoot to expose**

**Bamboo Shoot as it emerges outof the ground**

Shoot and not the rhizome neck. The soft tender texture of the Shoot cuts easily. It is important to leave some shoots to grow into culms to maintain clump vigour.

**Shooting Criteria**

**Soil Suitability**: The soils should be loose and porous for the easy shooting of the Bamboo Shoot. They must be exposed to plenty of sunshine. Lowland and hardened soils are not suitable for Bamboo Shoot production. Upland slopes are the ideal locations.

**Soil Management**: The soil management measures include soil loosening, fertilization, soil covering. The most important activities in Bamboo Shoot production are the soil loosening and fertilization.

**Harvesting Season:** Bamboo Shoot for edible purposes is to be harvested during the season of its sprouting from the ground. Most of the species give rise to new Shoot during or soon after the monsoons in their region of growth.

**Harvesting Size & Time:** The recommended size of the young Shoot for harvesting is that it should be about 37.5 cm (15”) to 45 cm (18”) above the ground. It may not be required to dig the ground to extract the Shoot. The clumps have to be monitored visually during this time to check for the new Shoot and their growth. The Shoot would reach harvesting size within a couple of days within its breaking away from the soil crust. In some cases this size may be attained within 24 hours. The ideal time for harvesting of the Shoot would be late evening or early morning. The harvested Shoot start to degenerate if not properly stored or handled.

Care should be taken to retain the outer culm sheath intact without damaging or tearing it away. This has been found to retain the freshness of the Bamboo Shoot.

# *Chapter – III*

# *Nutritional Information*

# *Of Bamboo shoot as food*

## Bamboo Shoot As Food

Pale, sturdy, mild in appearance, yet distinct in flavour, Bamboo Shoot has been absorbed into traditional Indian cuisine quite naturally in areas where it is easily available. It is an often-used foodstuff, particularly in North Eastern India and the Western Ghats of Southern India. Similar in geography, both these pockets (North Eastern India & Western Ghats) house a considerable amount of natural Bamboo. Plentiful rainfall makes the terrain ideal for Bamboo to flourish.

When food was scarce and access to foodstuff was minimal, people were forced to find edible alternatives in the surroundings, from the forests mainly; and Bamboo Shoot is one such 'food from the forest' that they soon began to relish. Hence began the use of Bamboo Shoot as food substance.

### Bamboo Shoot in Tribal Cuisine [1]

Bamboo Shoot has been reported to be widely used by the tribes in the North East. It is consumed in its fresh form during the season of availability and as salted and fermented products during the other parts of the year.

In the **North East** pickles made of Bamboo Shoot are the commonly used in every household in the region and extensively used as a main ingredient in different fish preparations (curry, dry fish, etc) and also used in some dishes made of meat. The Bamboo Shoot are ground and fried before using them in certain 'Dal' preparations.

Bamboo Shoot are consumed like any other vegetable in the Northeast. In Assam, Bamboo Shoot are sourced along hillside, crushed and packed in Bamboo containers (a customary form of packaging here) by local tribes called 'Karby' and brought in to urban areas for sale. It is preserved either with crystal salt, in brine or in mustard oil.

Apart from Northeastern population, other communities in **Kashmir**, the Konkan also use shoots in different preparations. They are mainly curry dishes besides regularly used processed food items like Pickles, Papads, etc.

The Bamboo Shoot has interestingly been an integral part of indigenous cuisine in the remote corners of the **Western Ghats in Karnataka**. The hills of the **Ghats from Gujarat to Tamil Nadu** elucidate examples of Bamboo Shoot usage in traditional cooking in very many forms. The edible Bamboo species in the Western Ghats are *Dendrocalamus strictus* and *Bambusa bambos*. From pickles, snacks, *papads* & other fried stuff to curries, *bhaajis*, and other preparations with rice, Bamboo Shoot is used extensively in season.

## Nutritional Qualities

Bamboo shoot is rich in vitamins, cellulose, amino acids and trace elements and is a good source of fibre. Bamboo shoot comprises 90% water. Edible content of a newly harvested shoot is usually 25 to 30 per cent, with smaller shoot yielding a lower percentage edible content. Bamboo shoot can be consumed fresh or processed. Fresh Bamboo shoot has a crisp & sweet flavour. Bamboo Shoot is used in oriental cooking as an extender because it takes on the flavour of the ingredients it is cooked with.

It is reported that Bamboo shoot has some effect in cancer prevention and is very popular in the South East Asian countries. It is also used to increase the appetite and decrease blood pressure and cholesterol. As a widely consumed vegetable, Bamboo Shoot can be labelled as a heart protective vegetable and its component phytosterols may be suitable as nutraceuticals.

The FAO has recommended that the nutritional value for 100 grams of Bamboo shoot to be as follows:[1]

FAO Recommended Nutritional Values of Bamboo Shoot

| Sl. No. | Item | Value | Unit |
|---|---|---|---|
| 1. | Calories | 14.00 | Calories |
| 2. | Total fat | 0.30 | Grams |
| 3. | Saturated | 0.10 | Grams |
| 4. | Monosaturated fat | Nil | Grams |
| 5. | Polyunsaturated fat | 0.10 | Grams |
| 6. | Dietary fibre | 1.29 | Grams |
| 7. | Protein | 1.80 | Grams |
| 8. | Carbohydrates | 2.00 | Grams |
| 9. | Cholesterol | 2.00 | Grams |
| 10. | Sodium | 5.00 | mg |
| 11 | Potassium | 640.00 | mg |
| TOTAL | | 100.00 | Grams |

Young Shoot of many tropical species contain lethal concentrations and amounts of cyanogens. These cyanogenic glucosides on endogenic hydrolysis yield hydrocyanic acid, the content varying from 0.05% to 0.3%. Cooking destroys the enzyme responsible for the endogenic hydrolysis to a very large extent. Another constituent of the Bamboo Shoot, known as homogentistic acid is responsible for the (sometimes) disagreeable, pungent taste, characteristic of Bamboo Shoot.

The FAO has also drawn up the recommended nutritional data for both raw and canned Bamboo Shoot, given in Table below.[1]

Nutritional Data for Raw & Canned Bamboo Shoot

| | Calories (%) of Raw Bamboo Shoot | Calories (%) of Canned Bamboo Shoot |
|---|---|---|
| Carbohydrates | 58.9 | 52.7 |
| Fat | 8.3 | 16.0 |
| Protein | 32.7 | 31.3 |

**Results**

The results of the tests carried out on Bamboo Shoot samples of *Dendrocalamus hamiltonii* and *Bambusa pallida* are tabulated below:

Nutritional Quality of *Dendrocalamus hamiltonii* and *Bambusa pallida*

| Sl. No. | Parameter/Test | Unit | *D. hamiltonii* | *B. pallida* |
|---|---|---|---|---|
| 1. | Proximate | | | |
| 1.1 | Carbohydrate | % | 7.97 | 8.28 |
| 1.2 | Fat | % | 0.76 | 0.55 |
| 1.3 | Moisture | % | 93.5 | 93.25 |
| 2. | Minerals | | | |
| 2.1 | Iron | Mg/100g | 0.958 | 0.718 |
| 2.2 | Calcium | Mg/100 g | 14.378 | 13.738 |
| 3. | Vitamins | | | |
| 3.1 | β-Carotene | ppm | <0.1 | <0.1 |
| 3.2 | Niacin | ppm | <1.0 | <1.0 |
| 3.3 | Thiamine | ppm | <1.0 | <1.0 |
| 3.4 | Ascorbic acid | ppm | <1.0 | <1.0 |
| 4. | Microbial | | | |
| 4.1 | Total plate count | Cfu/g | 83,000 | 6,30,000 |
| 4.2 | Coliforms | Cfu/g | 15,100 | 58,000 |
| 4.3 | Yeast & Mold count | Cfu/g | 40,100 | 20 |

# *Chapter – IV*

# *Research Methodology*

## Market Analysis

Once a potential producer decides that he wishes to start a business, the first thing to do is to find out what is the likely demand for the fruit or vegetable product that he or she wishes to make, by conducting a short *market survey*. Although there are market research agencies that are able to do this type of work in many developing countries, it is better for producers to do it themselves (if necessary with assistance from partners or advisers) because they will then properly understand their customers' needs and how their business should operate. If an idea is found to be feasible, this knowledge will in turn give them the confidence to go ahead when problems are encountered, knowing that their product is in demand.
Although telephone or posted questionnaires are possible, in most developing countries it is better to conduct a market survey by going out into areas where the producer expects to find consumers and asking people for their views. There are two types of information that are needed:
1) information about the product and its quality and
2) information about how much people will buy, how often and for what price.

It is important to think in advance about the type of information that is needed and to ask people the same questions each time, so that their answers can be compared and summarised. This should be a short exercise to keep the costs low and in-depth market research is not necessary for most products. A convenient way of doing this is to prepare simple questionnaires such as those shown below, which can be used by entrepreneurs to remind themselves of which questions to ask.

### Product quality survey

Consumers are familiar with the types of fruit or vegetable products that are already on sale and surveys on these products are therefore easier than those for a completely new food. Questions can focus on what are the things that consumers like or dislike about existing competitors' products.

However, if producers wish to make products that are new to an area, they need to have samples for potential consumers to taste and give their opinion on whether they like the product and would be willing to buy it. (When asking people to taste a product, a supply of spoons should be taken so that each person interviewed uses a clean one). Samples can usually be made at home using domestic equipment so that an investment in production facilities is not needed at the this stage.

Although initially, new products have the advantage that there will be no competitors, the process of assessing demand takes longer and costs more than for products that are already known. In addition, as up to 80% of new products fail, the risks are higher and it may be more difficult to get a loan for this type of work.

Remember that the customer (the person who buys the food) is not always the same person as the consumer (the one who eats the food). This is particularly important when getting information about the quality of foods that are mostly eaten by children, as their

preferences for colour or sweetness may be different to those of their parents. For food producers, customers can also be retailers or other sellers in addition to institutions, other food processors and members of the public.

The results of such surveys can be analysed by adding together the numbers of people that gave answers such as 'very good', 'poor' etc.

Other information that can be gained by analysing the data includes:

1. a large majority of consumers liked having bamboo shoots in cans and that they were moderately happy with existing labels. This information helps to show a new producer what type of packaging must be used if he/she is to compete effectively with existing manufacturers or imported foods.

2. A majority of consumers (51%) were unhappy with the price of the bamboo shoots and this indicates that a potential market share exists, if a new product having a similar quality can be sold more cheaply.

# *Chapter – V*

# *Secondary Research*

**Market Search**

An internet market survey was undertaken to provide some understanding of the market for Bamboo Shoot, both with respect to World trade as well as for the Indian domestic market and for exports from India. The survey would also provide some insights of the high-end of the domestic market for Bamboo shoots of imported origin. The objectives of the market survey were defined as follows: -

• To provide an understanding of the quantum and value of exports of Bamboo Shoot from India – currently, over the past 3 to 5 years and likely future levels over the next 3 to 5 years.

• To provide an understanding of World trade in Bamboo Shoot – current, past and likely future over the next 3 to 5 years.

• To provide insights into the demand for processed Bamboo Shoot of imported origin in high-end domestic market.

• To provide insights into the current demand for Bamboo Shoot in the domestic market.

**Sample Size**

From a preliminary understanding of the Market for Bamboo Shoot it was felt that personal interviews should be carried out in the major fruit vendor and trading areas like Azadpur Mandi, Kotla Mubarkpur Market and a wide range of ethnic restaurants and cosmopolitan populations in Delhi were naturally chosen.

Leading **5 Star Hotels(Taj, Ashoka) and Upscale Specialty Restaurants(Bercos) serving cuisine that lend themselves to use of Bamboo shoot were identified** and contacted across the aforesaid centres. Based on the inputs obtained from respondents in the hotels and restaurants contacted, key importers and distributors of Bamboo shoot were identified and contacted subsequently.

**Caveats & Limitations**

The findings of the study must be qualified and viewed in the context of certain inherent limitations of the study. The limitations of the study are as follows:

• In the absence of any authentic data or data source relating to imports of Bamboo Shoot in India, information collected from major importers in Delhi,Kolkata,Bangalore, needs to be adopted as the only reliable source of information for arriving at the import estimates.

• There is a clear-cut dearth of information on World trade. All web-based resources provide information for only a few countries. In some instances guesstimates have been generated for select countries. Also, whatever data exists relating to World trade in Bamboo Shoot is somewhat outdated. Hard data for the product over a span of 3 or 5 continuous years are not easy to come by. Given this, I have attempted to arrive at indicative estimates of World trade in Bamboo Shoot for the year 2013.[2]

According to industry sources, it appears that there is no reliable information regarding the quantum of cultivation or supply and processing of Bamboo Shoot, since it is not an organized market.

**World Trade**

The findings on the World Trade in Bamboo Shoot are presented here:

• Bamboo shoots are important constituents of stir-fry cuisine and specialized recipes. They are produced and consumed in great quantities in China, Taiwan, Thailand, Japan and Korea. Taste and presentation vary widely from country to country.

• In these countries where bamboo shoots are traditionally consumed, they rank high in the list of vegetable production volumes (e.g. second in volume in Taiwan), and they are ideally consumed fresh.

• The two most preferred species for tropical production are *Dendrocalamus latiflorus* and *Dendrocalamus asper*. While *D. asper* is the most important species for shoot production in Thailand, *D. latiflorus* and *Bambusa oldhamii* are the most important ones in Taiwan.

• In the export market, shoots of *D. asper* and *D. Siamensis* are the main species. More than 90% of the exports consist of steamed shoot, while the rest is deep-frozen and dry shoot.

• Bamboo shoot are most valued in the fresh and dried forms. The prices of canned bamboo are lower compared to that of fresh bamboo shoot.

• As far as exports are concerned, bamboo shoot are canned and exported predominantly from Taiwan, China and Thailand, with the latter two countries being the largest suppliers to the World market.

• The total value of World trade for Bamboo Shoot is estimated at approximately Rs.3,200 to Rs.3,400 Crores for the year 2010. In volume terms it is approximately 3,00,000 Tonnes.

Estimated Annual Import / Export Statistics for Major Countries[2]

| Country | Imports (Tonnes) | | Export (Tonnes) | |
|---|---|---|---|---|
| | Canned | Fresh/Frozen | Canned | Fresh |
| Australia | 12,000 | --- | --- | --- |
| Japan | 130,000 | 4,000 | --- | --- |
| USA | 44,000 | --- | --- | --- |
| Taiwan | 5,000 | --- | 38,500 | 1,500 |
| China | --- | --- | 143,000 | 7,000 |

| Country | Imports (Tonnes) | | Export (Tonnes) | |
|---|---|---|---|---|
| | Canned | Fresh/Frozen | Canned | Fresh |
| Thailand | --- | --- | 68,000 | --- |
| Others | 99,000 | 6,000 | 40,500 | 1,500 |

| | | | | |
|---|---|---|---|---|
| Total | 290,000 | 10,000 | 290,000 | 10,000 |

In the year 2010, the quantum of Chinese Bamboo Shoot export was 150,000 Tonnes valued at Rs.1,200 Crores. In volume terms, China's share of total exports was pegged at almost 50%. The major countries to which Chinese Bamboo Shoot are exported include Japan and USA, accounting for approximately 74% and 11.5% respectively.

Thailand and Taiwan are the next two major exporters after China. The exports from Thailand and Taiwan appear to be around 68,000 Tonnes and 40,000 Tonnes respectively, accounting for 23% and 13% of World exports. Both Taiwan and Thailand benefit from the opportunities in Japan, USA and Australian markets by making the bulk of their exports to these countries, believed to account for about 60% of the Bamboo Shoot exports of these countries. India also imports very small quantities from Thailand.

Japan, Korea, USA and Australia are the major importers of Bamboo Shoot besides European nations.

Published information about Japan's year wise imports of Bamboo Shoot is available albeit 2-3 yrs old. Japan imports fresh shoot as well as canned shoot. Japan's imports of Bamboo Shoot are around 134,000 Tonnes per annum contributing to 45% of the total imports in the World. Clearly, current and prospective exporters of Bamboo Shoot are eyeing this market keenly. While the imports of fresh Shoot are estimated at 4,000 Tonnes per annum, the quantity of canned Shoots is about 130,000 Tonnes per annum, almost 97% of the total imports. Reportedly, the imports of fresh Shoot are decreasing as a result of shortage of labour and unstable weather in Taiwan.

Japan's production is said to be declining. The Japanese production season runs from March to July and most imports are during November to March, in frozen (without sugar), canned and dried forms. Imports from China used to be mostly in 18 litre cans, but a much greater variety is now available, including retail size vacuum packs. Nevertheless, China is still largely a low price provider.

The imports of USA and Australia in the year 2010 are estimated at around 44,000 Tonnes and 12,000 Tonnes per annum respectively, accounting for 14.5% and 4.0% of the total World imports.

Australia has been identified as a potential market for exports of Bamboo Shoot given the increase in Asian tourists and residents and also changing tastes. This explains the growth of Bamboo Shoot in Australia from an estimated 4,000 Tonnes per annum in the early 1980s to the current estimate of 12,000 Tonnes per annum. Domestic consumption is said to be increasing at 20% per annum, according to Australian research institutes. The net retail price of canned Bamboo Shoot ranges from Australian $4 to $8 per kg. Prices peak toward the end of February just before the Chinese New Year.

USA imports most of its Bamboo Shoot from Thailand, but the proportion from China is increasing while the overall volume remains static. Bamboo Shoot from Japan fetches a much higher price than from other countries at around US$5 per kg. The average price, across all Bamboo Shoot imports into USA however, is around US$1 per kg.

Another important importer and consumer of Bamboo Shoot is Korea, assumed to be next in line to Japan and USA. However, in the absence of reliable information about its imports, our estimate would be anything upwards of 12,000 Tonnes per annum, treading ahead of Australia, in volumes.

Imports of processed Bamboo Shoot are rising in Japan and Taiwan. Given the fact that China accounts for the bulk of Bamboo Shoot imports into these 2 countries, prices paid by these countries tend to be low and in line with the prices of Chinese products. Taiwan is said to have imported only canned Bamboo Shoot estimated at 5,000 Tonnes in 2000. The main sources of Bamboo Shoot in Taiwan are from Thailand, China and the Philippines.

Hong Kong imports fresh and canned Bamboo Shoot from China and re-exports to Singapore, Taiwan and USA.

Singapore's consumption is mainly of canned shoot, but frozen cooked Bamboo Shoot are also used.

If industry reports in Australia are any indication, the country by stepping up its own Bamboo Shoot cultivation is expected to address not only its own requirements but also export avenues, especially the high potential destinations viz., Japan and Taiwan. The months of scarcity for fresh Bamboo Shoot in Japan (November to March) coincide with those of peak production in Australia. Research also suggests that it can target a steady market of 250 Tonnes a month in Japan. Similar months of scarcity in Taiwan also dovetail with Australia's harvest of fresh Bamboo Shoot.

**Conclusions**

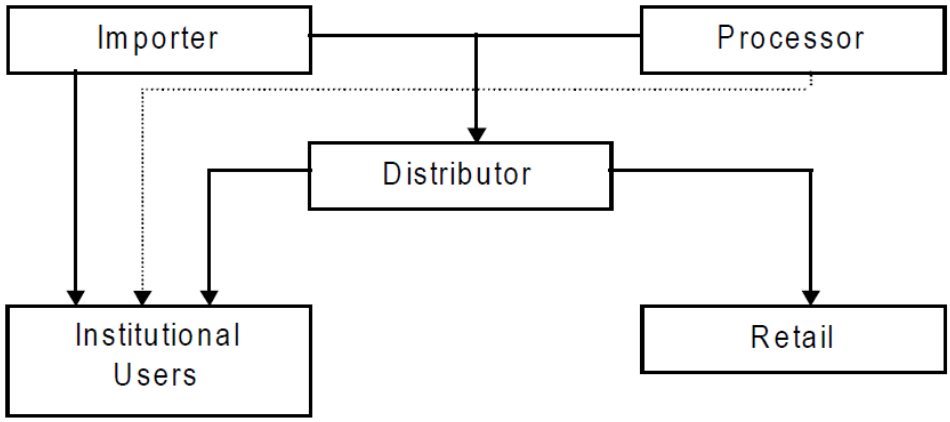
To summarise, the World market for Bamboo Shoot is estimated at Rs.3,200 to 3,400 Crores in value and 300,000 Tonnes in volume terms. The growth rate of consumption by major importing countries in the last 3 to 4 years has been around 2% to 3% year on year.

The growth rate for next 3 to 4 years can be expected at 2% to 3% year after year. The rationale for this view is the past growth of imports by Japan and Australia, declining production of Bamboo Shoot in Japan, etc.

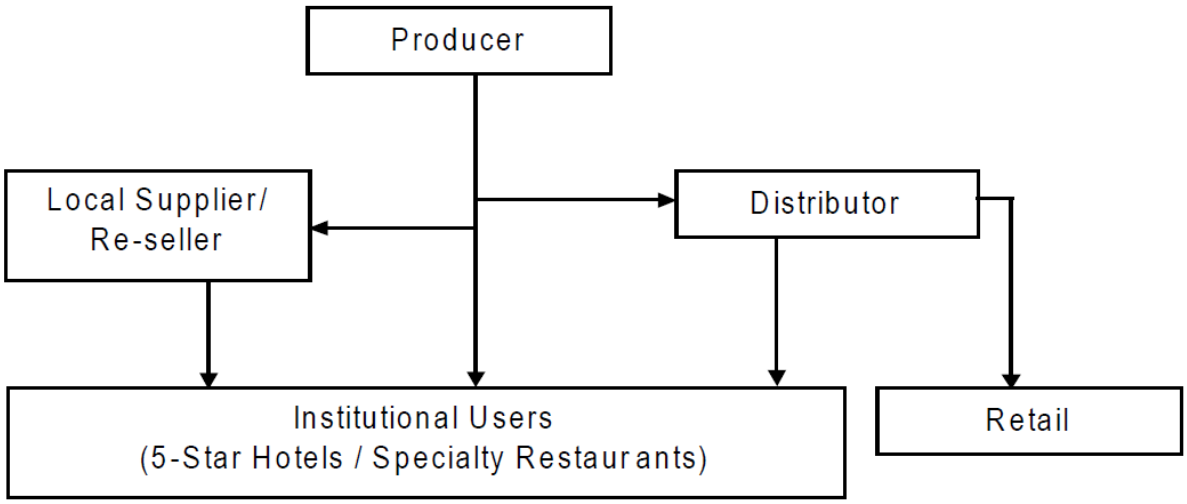
**Domestic Market for Bamboo Shoot**

**Availability of Bamboo Shoot & User Segments**

Distribution Chain for Canned Bamboo Shoot




Distribution Chain for Fresh Bamboo Shoot




By and large, in the case of institutional end-users, the local suppliers/resellers individuals cater to the Bamboo Shoot requirement. However, if the consumption of an institutional end-user is quite high, there have been instances observed during the study where the producers themselves have directly supplied.

Local suppliers/resellers are basically either small agencies or individuals catering to the day-to-day requirements of hotels and restaurants. These suppliers concentrate on Chinese food ingredients.

**Market Size Estimates**

As far as institutional consumption of Bamboo Shoot is concerned, it is widely used in Chinese and Thai dishes. Chinese cuisine has gained considerably in popularity in India over the years and is the most widely patronized among all the cuisines of foreign origin. All the cities in India have specialty restaurants offering Chinese food items, besides other cuisines. While the size and scale of operations of these restaurants differ, most of these use some quantity of Bamboo Shoot. Many other upscale hotels and specialty restaurants offer other cuisines like Japanese, Malaysian, Korean, Mexican, Cambodian, Vietnamese, etc.

Among the multi cuisine hotels and specialty restaurants contacted during the survey, Chinese dishes account for more than 60% of shoots consumption, with the balance accounted for by Thai, other Oriental and Continental etc.

Information regarding monthly consumption was elicited from upscale Hotels and Specialty Restaurants. It varied anywhere between 30 kgs and 90 kgs per month. Distributors, Importing Agents were also contacted to understand sale of fresh and imported products.

**Local stores catering to the requirement of different communities were identified and contacted to obtain information regarding their annual sale. It was found that availability in such shops was restricted to the season. For example in Delhi/NCR Mandis, such shops stock and sell between June and December.**

**The annual consumption of Bamboo Shoot for the year 2011 – 2012 is estimated at 132 Tonnes.[Page 10, Delphi(2011)]**

**The breakup of consumption by end-user segment is as follows, also shown in the**

- **Institutional** — **108 Tonnes**
- **Hotels** — **24 Tonnes**
- **Specialty Restaurants** — **84 Tonnes**
- **Households & Producers of Process Foods** — **24 Tonnes**

The break-up of the estimates as local and of imported origin was as follows and is shown below:

- Fresh/ Local 128 Tonnes (97%)
- Imported 4 Tonnes (3%)

Observations indicate that the bulk of the imported quantity is for the consumption of the institutional end-users.

**Growth Estimates**

The growth of Bamboo Shoot market, in volume terms, has been about 5 to 10% in the last 2 to 3 years.

Over the next 3 to 5 years, this market is expected to register similar growth rates of 5 to 10 % per annum, in volume terms.

Based on the expected rate of growth, the market size for **Bamboo Shoot will be around** 164 Tonnes for the year **2014 – 2015**.

**Analysis Of Market Opportunities & Need Gaps**

In India, the demand for Bamboo Shoot appears to be low, inspite of the abundant availability of some good species.

Household consumption is just restricted to selected ethnic groups. As far as processed food items are concerned, its growth is again a function of demand from these ethnic groups.

The largest end use segment, comprising the 5-Star Hotels and Specialty Restaurants, is still in a nascent stage as far as Bamboo Shoot consumption is concerned. Inclination towards oriental and continental cuisines among the masses is promising and the changes will determine the consumption of Bamboo Shoot.

Some quarters in the hotel and specialty restaurants have revealed that growth in this market is constrained by the fact that Bamboo Shoot consumption is an acquired taste and the relatively small user base at present.

Erratic quality of Bamboo Shoot has restricted for some of the specialty restaurants from promoting dishes made of Bamboo Shoot.

For now, hotels and specialty restaurants appear to be the most potential user segments for Bamboo Shoot. This segment is expected to grow at the rate of 5 to 10% given the fact that Chinese cuisines are becoming part of urban life style.

Also any increase in demand for Thai food is also likely to bring about demand for Bamboo Shoot, as most of the Thai cuisines need them in their preparations.

There are currently a few unsatisfied needs the hotel and specialty restaurants are facing, which needs to be studied for making meaningful conclusions. They are:

- Regular supplies of low volume packs (packs of 1 to 2 kg). There exists a gap in the current offering
- Good quality. – To address areas like wastage, odour, texture, taste, etc.

Any new player entering the market with Bamboo Shoot of reasonably good quality, equivalent to that of imported products and priced lower than imported, can expect to make a dent in the market.

On the exports front, fast growing markets like Japan and Australia are definitely worth targeting as they offer huge business potential for any prospective exporter of good quality shoots. The options before India are either exporting finished canned shoots, a demanding proposition or exporting shoots to processors in these countries for final leg of processing and marketing.

Given the resources of species for producing good quality Bamboo Shoot, India in all probability, can emerge as a new entrant in the World trade with well designed moves.

**User Evaluation**

The scope calls for organoleptic evaluation of 5 to 7 dishes prepared from Bamboo Shoot suitable for the Indian palate, with an objective to providing an understanding of the potential of the product for market acceptance and the market potential for Bamboo Shoot.

**Selection of Recipes**

Researching for recipes across a wide database through the Internet and through desk research, a primary list of recipes was prepared.

**This was evaluated for:**

• Relevance to the Indian cuisine
• Method and ease of preparation
• Quantum of Bamboo Shoot required

Recipes are then short-listed from the primary list and recipes suiting the Indian palate and a few exotic dishes were selected for the trials. An in-house team evaluated the trial dishes prepared and selected the following dishes for further evaluation by an external panel of judges.[2]

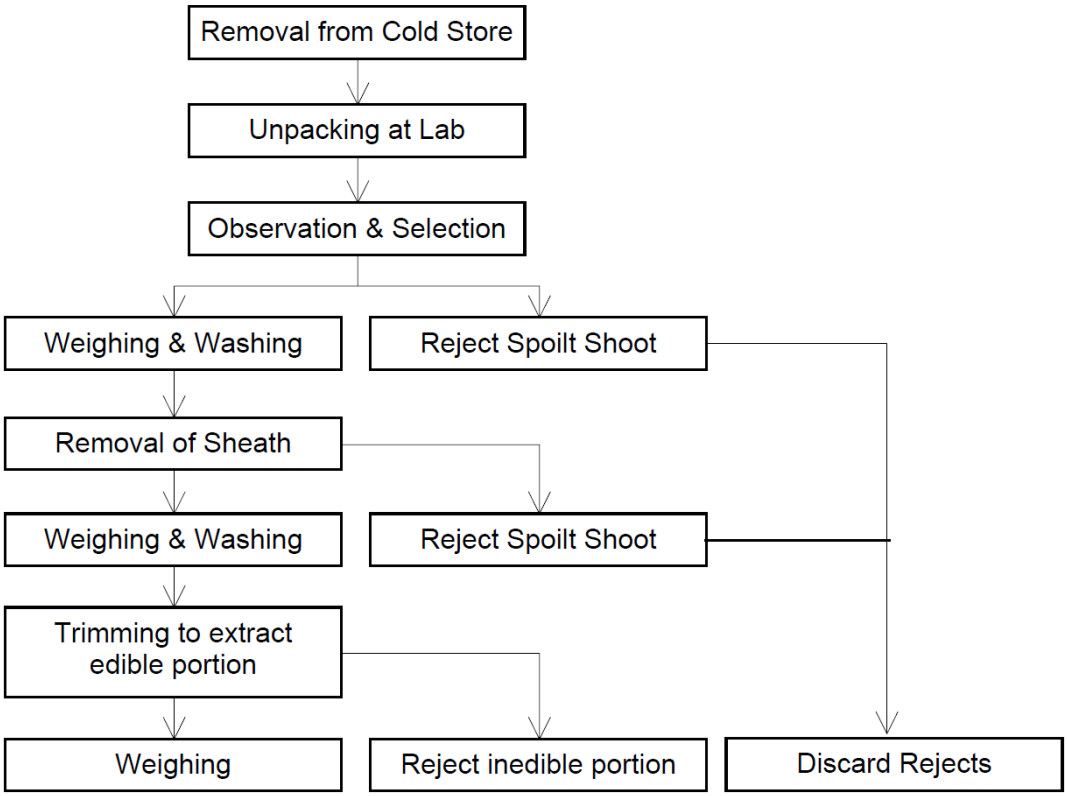
| Final List of Dishes Selected Sl | Name of Dish |
|---|---|
| 1 | Bamboo Shoot Bajji |
| 2 | Bamboo Shoot Chutney |
| 3 | Bamboo Shoot Fry (Pakoda) |
| 4 | Bamboo Shoot Gajar Halwa |
| 5 | Bamboo Shoot Kadhi |
| 6 | Bamboo Shoot Keema |
| 7 | Bamboo Shoot Manchurian |
| 8 | Bamboo Shoot Palak |
| 9 | Bamboo Shoot Pickle in Vinegar |
| 10 | Bamboo Shoot Pulav |
| 11 | Bamboo Shoot Russian Salad |
| 12 | Bamboo Shoot Soup |

## Preparation of Dishes[3]

### Extraction of Edible Portion

The harvested Bamboo Shoots received were held in a cold store at refrigerated temperatures (+4°C) prior to being utilized. The shoot after removal from the cold store was peeled to extract the edible portion. The procedure for extracting the edible Bamboo Shoot is shown in figure below:

Procedure for Extraction of Edible Shoot




**Pre-cooking Preparation**

Freshly harvested bamboo shoot, in particular, has a necessity for a precooking preparation, primarily, to remove the toxic and bitter components from the Bamboo Shoot. **Most of the suggested methods mainly included** soaking in water (for differing periods and times), boiling the Bamboo Shoot (for differing periods and times), prior to the preparation of any dish.

For carrying out the further trials using fresh Bamboo Shoot for preparation of dishes, the pre-cooking method that was adopted was to soak the raw Bamboo.

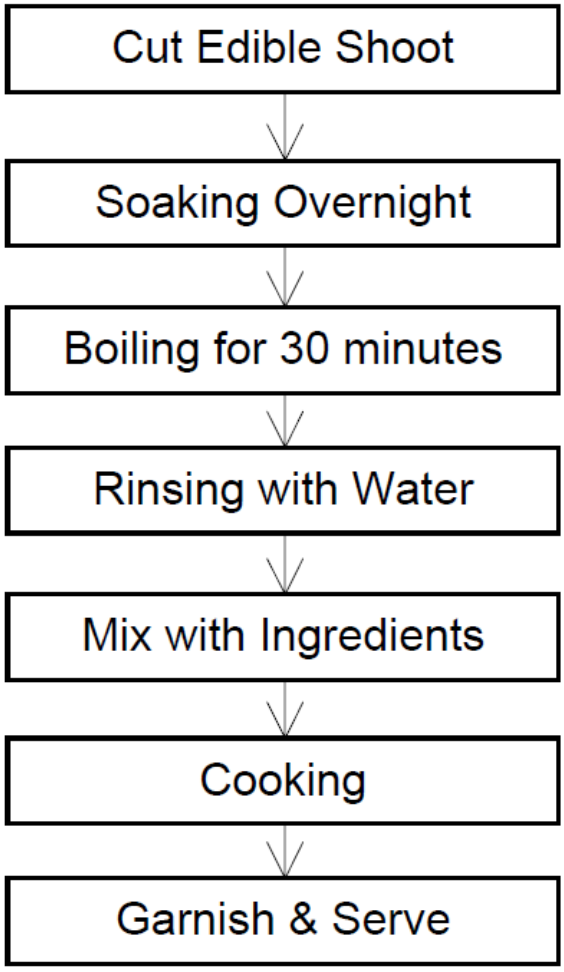
Shoot overnight and boiling for a total of 30 minutes with the change of water every 10 minutes.

The above pre-cooking preparation would be necessary only if fresh Bamboo Shoot is used for the preparation of any dish. It would not be necessary if preserved Shoot such as Salted or Brined Shoot are used.

**Dishes**

For the recipes selected, the dishes were prepared by an experienced chef following the pre-cooking method described earlier and as per the method of preparation of the Dishes. The Figure below shows the general procedure followed for the preparation of dishes.

## Procedure for Preparation of Dishes




The method of preparation of the dishes is covered in depth in a separate link. This report also gives the pictures of the dishes prepared and the charts depicting their organoleptic evaluation. We have, however, reproduced the pictures of the dishes in this section as a ready reference.

**Organoleptic Evaluation of Dishes**

The dishes prepared were presented to a panel of judges for organoleptic/sensory evaluation of the dishes. The panel members selected represented different cultures, age, sex and culinary habits. For a better appreciation of the dishes, a couple of the members were selected who basically hailed from the North East and those who had a previous exposure to Bamboo Shoot in their cuisine.

**Sensory Evaluation**

The panel members were briefed on the evaluation process and the filling-in of the forms provided. The members were to sample the dish and record their observation on a 5 point Hedonic scale as:

- Like Extremely
- Like Moderately
- Neither Like/Dislike
- Dislike Moderately
- Dislike Extremely

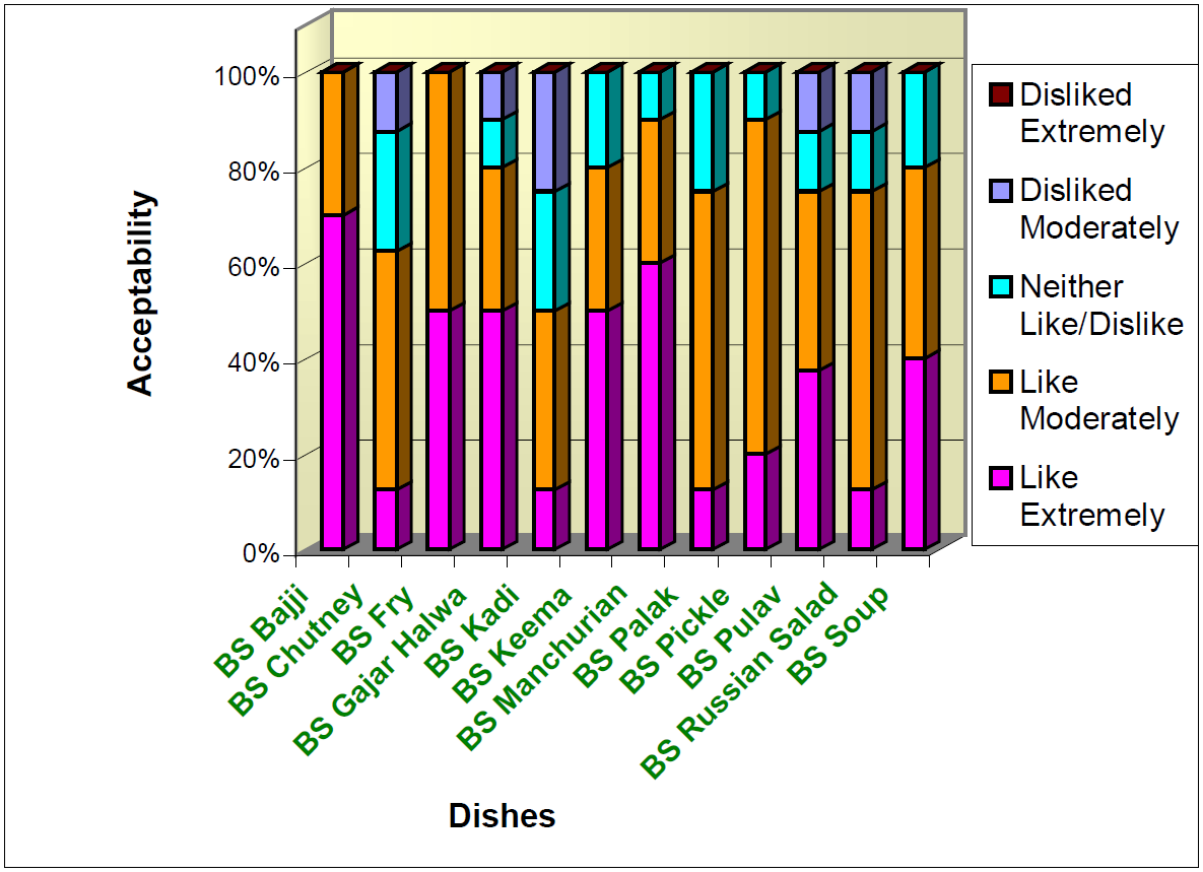
The parameters to be evaluated were:

- Appearance
- Odour
- Flavour
- Mouth feel
- Overall Acceptability

**Results**

The Organoleptic evaluation of the dishes prepared and tested by the evaluation panel is given as a Bar diagram for the dishes prepared. The Overall acceptability of the dishes is shown in the Chart below:

Overall Acceptability of Dishes[Page 15, Delphi(2011)]




**Analysis**

The data analysis showed that incorporation of Bamboo Shoot in the recipes has a moderate impact on the acceptability of the product. The Bamboo Shoot used in food items such as Keema, Manchurian, Bajji, and Fry were very well accepted in terms of Flavour, Odour, Appearance, Mouth-feel and Taste. The products like Pulav, Pickle, Palak, Salad and Carrot Halwa were accepted overall but for the Flavour and the Mouth-feel.

The study also indicates that none of the products were disliked except the Chutney and Kadhi which were not overall acceptable.

# *Chapter – VI*

# *Processing*

**Post Harvest Practices**

Bamboo Shoot after harvest, having been cut off from the parent rhizome, behaves like any other vegetable. The cut end is exposed to the atmosphere with chances of spoilage through the action of microorganisms. The sheathed Bamboo Shoot also tends to lose moisture escaping through the sheath and appear dry.

An attempt was made to study the storage of fresh Bamboo Shoot in the sheathed and peeled form.

**Handling of Fresh Bamboo Shoot**

The harvested Bamboo Shoot with or without the sheath, are disposed off within a couple of days. The peeled Bamboo Shoot in brine is stored for a longer duration.

**Storage Studies of Fresh Bamboo Shoot**

The samples of the Bamboo shoot received at Bangalore at various times during the study were held in a commercial cold store soon after its receipt. The Bamboo Shoot were extracted from their primary pack (as received) and repacked after culling out the visibly spoilt Bamboo Shoot. This was repacked and dispatched to the cold store for holding until further use later.

The shelf life study on the Bamboo Shoot was conducted by holding freshly peeled Bamboo Shoot under ambient room and Refrigerated conditions (at 8°C).

The edible portions (peeled Bamboo Shoot) were stored in Zip-lock polyethylene covers.

- The observations were made every alternate day, for a fortnight. The observations of the two varieties of Bamboo Shoot kept at room & refrigerated temperatures are given under **Table** below.

Observations of Storage Studies of Fresh Bamboo Shoot[3]

| Day | General Condition Observed | | | |
|---|---|---|---|---|
| | *Bambusa pallida* | | *Dendrocalamus hamiltonii* | |
| | Room Temperature | Refrigerator | Room Temperature | Refrigerator |
| 0th day | Beginning to rot with a slight change in colour | In good condition | Root tip beginning to rot | In good condition |
| 2nd day | Mold formation, stinking smell, liquid formation, black coloration | Edges beginning to rot | Half rotten with blackish colour, Stinking smell | Colour change to yellowish brown |
| 4th day | Fully rotten & stinking Smell with liquid formation | Pasty substance formation in inside layers, change in colour to yellowish green, Edges beginning to rot | Fully rotten and Stinking smell complete discoloration | Bottom tip brownish black |
| 6th day | Completely Rotten. Sample was Discarded | Pasty substance formation seen on the outside layers Fully rotten on the outside with light brownish colour formation | Completely Rotten. Sample was Discarded | Half rotten with blackish brown colour formation |
| 11th day | Sample Discarded | Pasty substance on the inside and Outside. Continued to be rotting | Sample Discarded | Complete Discoloration. Continued to be rotting |
| 13th day | Sample Discarded | Completely Rotten. Sample was Discarded | Sample Discarded | Completely Rotten. Sample was Discarded |
| 15th day | Sample Discarded | Sample Discarded | Sample Discarded | Sample Discarded |

By the end of 6th day, the edible shoot stored at room temperature was discarded, as the Shoot were completely rotten. And by the end of the 13th day, the samples kept in the Refrigerator were discarded since they too were completely rotten.

- Microbial tests were carried out on the peeled samples of *Dendrocalamus hamiltonii* on a weekly sampling plan for the first 3 weeks. The total plate count, Coliforms and yeast & mold count were estimated and the findings are tabulated under below:

Microbial Counts during Storage of Peeled *D. hamiltonii*

| Week | TPC (cfu/g) | Coliforms (cfu/g) | Y & M (cfu/g) |
|---|---|---|---|
| 1st Week | 81,000 | 64,000 | 4,300 |
| 2nd Week | 1,15,00,00 | 2,18,000 | 56,000 |
| 3rd Week | 9,30,00,000 | 1,24,00,000 | 84,00,000 |

The microbial load viz. Total Plate Count, Coliforms count & Yeast & Mould count of Bamboo Shoot was determined for three consecutive weeks. A drastic increase has been observed in the Total Plate Count, coliforms and yeast & mould count at the end of 3rd week, by almost 2 log cycles.

Bamboo Shoot storage studies can be summarised as below:

- The freshly harvested Bamboo Shoot with the sheath retained, can be stored for about 1 day under ambient conditions and upto 7 days under refrigerated conditions without substantial loss in yield or spoilage.
- The freshly peeled Bamboo Shoot (after removal of the outer sheath) cannot be stored under ambient conditions even for 1 day, as the Bamboo Shoot begins to degenerate and is prone to spoilage by microorganisms.
- There is a rapid and noticeable physical change in the peeled Bamboo Shoot combined with microbiological and chemical changes, under ambient conditions.
- The peeled Bamboo Shoot can be stored under refrigerated conditions for about 3 to 4 days.

Since the refrigerated Bamboo Shoot are found to last longer than the ones held at room temperature, it can be declared that Cold Storage of both sheathed and peeled Bamboo Shoot is necessary to increase their shelf life.

**Processing Of Bamboo Shoot**

Bamboo Shoot are traditionally consumed more often as a fresh vegetable during their season of availability and are preserved conventionally as salted, fermented and dried products in the NE regions of India and as salted and pickled products in the Western Ghats in Karnataka. The Bamboo Shoot is preserved primarily for home consumption

and is not intended for sale. The processes adopted by the native populace are based on traditional knowledge.

An attempt has been in this study to look at the traditional processes and evaluate them in the light of the modern and scientific principles of food preservation to arrive at suitable processes that could be adopted for preserving and processing the Bamboo Shoot at both, the cottage and large industrial scale of operations. The processed products have also been evaluated for the various packaging options available today, and their performance for long term storage.

**Objectives**

The objectives of the experiments carried out on the Bamboo Shoot are:

• Apply certain standard preservation methods on Bamboo Shoot to evaluate their suitability

• Process the Bamboo Shoot on a laboratory scale, into intermediate bulk and retail products

• Carry out shelf life studies of processed & packed products

• Propose suitable processes for industrial scale manufacture

**Approach Methodology**

Bamboo Shoot samples were held in commercial cold storages soon after their arrival in Bangalore until their withdrawal for experimentation. Preservation & Processing methods for Bamboo Shoot were scanned for using the Internet and published literature and four methods identified for experimental investigation. Process standards were tried for a minimum of two alternatives to enable standardization of the processes.

**Preservation & Processing Methods**

The preservation & processing methods evaluated are:

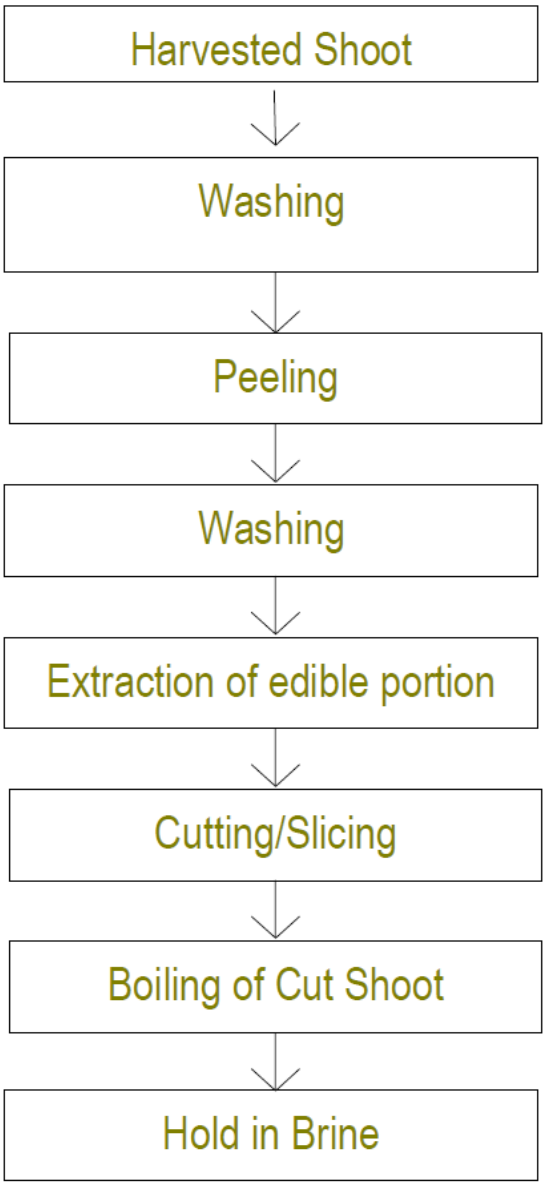
• Dry salting
• Wet salting/Preservation in Brine
• Canning
• Drying

**Pre-Processing of Bamboo Shoot[2]**

The pre-processing of Bamboo Shoot is essentially the steps employed to prepare the harvested Bamboo Shoot prior to conveying it for a processing method. The pro-processing of Bamboo Shoot comprises the handling of harvested Bamboo Shoot, removal of the external sheath (peeling), washing to remove adhering soil, hairs of the plant, etc., extraction of the edible portion from the peeled Shoot, trimming/cutting to obtain the desired shape & size of the edible portion.

To prevent any discoloration by the action of enzymes or exposure to the atmosphere, the boiled Bamboo Shoot were held in a 3% solution of brine until its use for experimentation.

□□Pre-Processing of Bamboo Shoot




**Dry Salting**

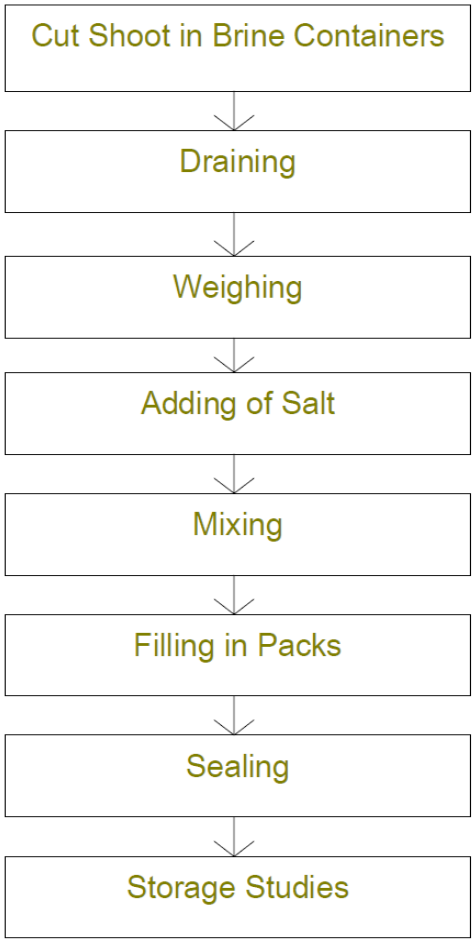
Dry salting is the method of preservation of the cut Bamboo Shoot in salt. Dry and crystalline salt is added to the cut Bamboo Shoot at 15% to 18% of the weight of the Bamboo Shoot, mixed for proper contact with the product and packed in a container inert to the corrosive action of the salt.

In the experiments, the cut Bamboo Shoot held in the brine solutions was drained and the drained weight recorded, to calculate the amount of salt that would be required for adding. Salt at 18% was added to the cut Bamboo Shoot and mixed by hand. The mixed pieces were filled into different plastic pouches and also in 1 litre PET jars. The plastic pouches were sealed using a hand operated heat sealing machine and the jars

were screw capped manually. The packets were labeled for the variety and date of packing. They were then stored under room conditions for observations.

The Figure below shows the flow chart of the dry salting method

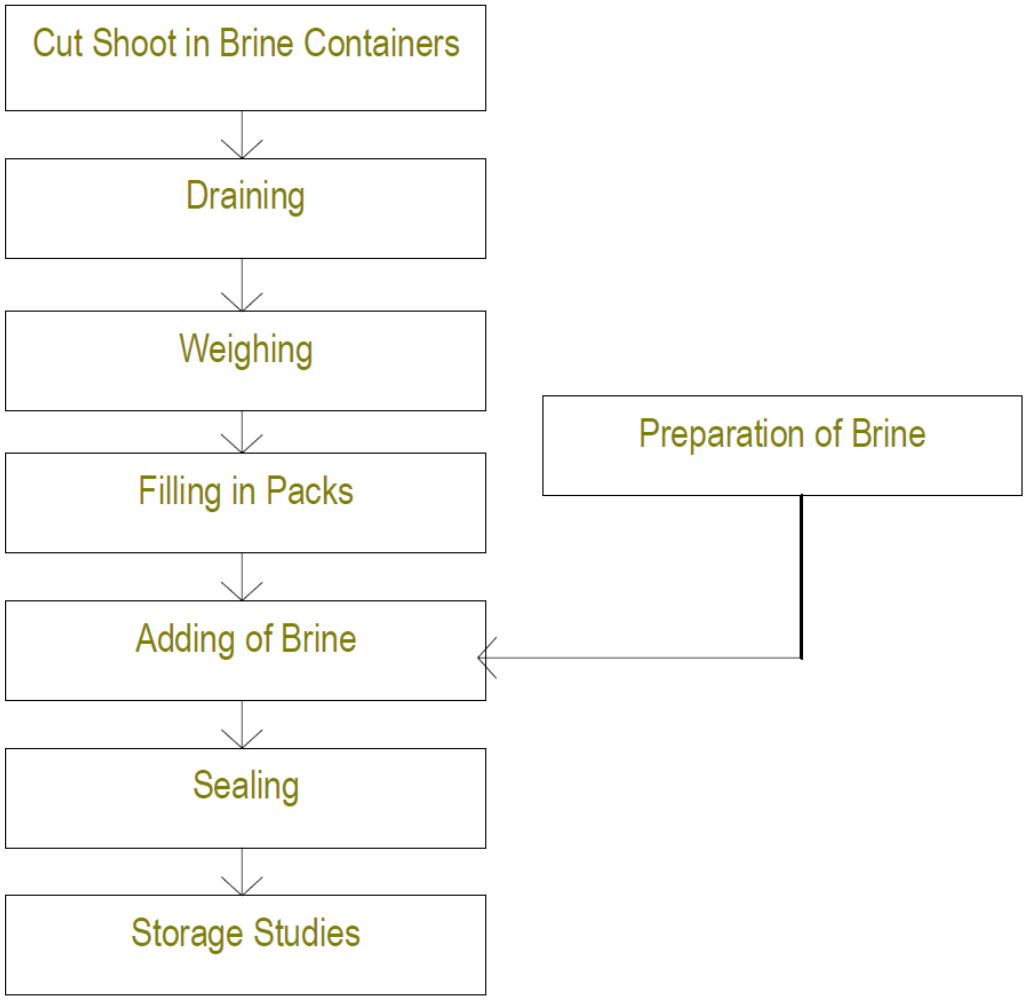
Dry Salting of Bamboo Shoot




**Wet Salting**

Wet salting is the method of preservation of the cut Bamboo Shoot in salt solution or brine. Salt solution (15% brine) is added to the cut Bamboo Shoot and packed in a container inert to the corrosive action of the salt solution.
In the experiments, the cut Bamboo Shoot held in the mild brine solution was drained and the drained weight recorded, to calculate the amount of brine (of the required strength of 15% salt solution) that would be required. The cut pieces were filled into different plastic pouches and also in 1 litre PET jars and the freshly prepared brine added to cover the entire pieces. The plastic pouches were sealed using a hand operated heat sealing machine and the jars were screw capped manually. The packets were labeled for the variety and date of packing. They were then stored under room conditions for observations.

Wet Salting of Bamboo Shoot




**Drying**

Drying is the method of preservation of the cut Bamboo Shoot by the forced removal of moisture from within the product by blowing hot air in a mechanical drier. The moisture in the final dried product is brought to such low levels that proliferation of the spoilage microorganisms will be halted.

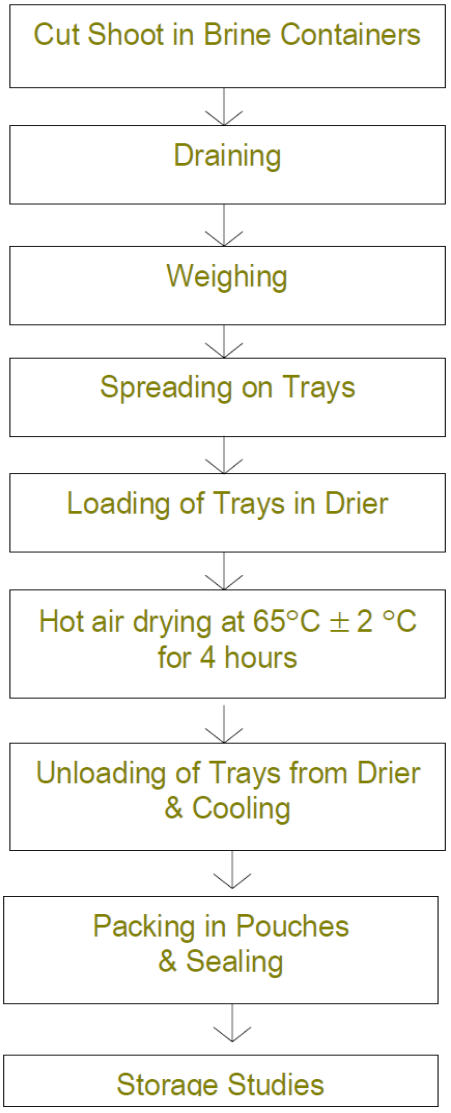
The final moisture content of the dried Bamboo Shoot would be less than 10% from an initial content of more than 90%. Care must be taken to maintain the air temperature and velocity so as not to damage the product. The dried product would have to be packed in an air tight plastic pouch to prevent absorption of moisture by the dried product.

In the experiments, the cut Bamboo Shoot held in the mild brine solution was drained and the drained weight recorded, for calculation of the moisture lost due to drying. The cut pieces were spread uniformly on the stainless steel trays and the trays were loaded

into a pre-warmed hot air cross flow drier. The temperature of the air in the drier was adjusted to 65°C ± 2 °C and the time of loading noted. The temperature was periodically checked and recorded. The in-built thermostat enabled maintenance of a uniform air temperature. After 4 hours of drying the product is checked for complete drying and the trays are unloaded from the drier. They are then cooled at room temperature. Once cooled the dried Bamboo Shoot are filled and packed in plastic pouches. They are kept under observation for their shelf life and rehydration properties.

The **Figure below** shows the flow chart of the drying method employed

Drying of Bamboo Shoot



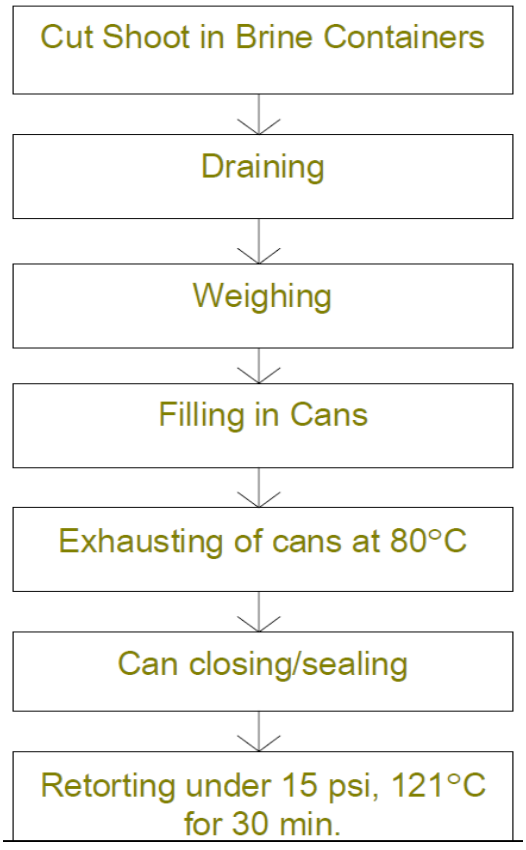
**Canning**

Canning of Bamboo Shoot is an established method of preservation and canned Bamboo Shoot products are exported by most of the leading processors of Bamboo Shoot globally.

In the experiments, the peeled Bamboo Shoot are cut into slices and the slices are held in the mild brine solution. They are then drained and the drained weight recorded. The sliced Bamboo Shoot are blanched in boiling water for 4 minutes, cooled, and filled in open top sanitary cans. The cans are filled with freshly prepared brine. The lids are placed on the top and conveyed into the Exhausting chamber at 80°C for 10 minutes. The exhausted cans are conveyed to the can seaming machine in the hot condition and the top lid is seamed. The sealed cans are transferred to the pressure retort in crates. The sealed cans are pressure cooked (retorted) at 15 psi and 121°C for 30 minutes. The retorting process is checked for the pressure and temperature attained. After the stipulated time, the pressure in the retort is slowly released and brought to the ambient pressure. The cans in the crates are immediately cooled to room temperature of 28°C to 30°C by dipping the cans in chilled & chlorinated water. As the cans attain temperatures nearing the ambient, they are removed from the cooling tank and transferred on racks for air drying of the surface. After complete drying the cans are wiped and labeled.

The canned products are tested for quality of the process.

Canning of Bamboo Shoot



## Conclusions

The different methods of processing of Bamboo Shoot were experimentally carried out for the species: *Dendrocalamus hamiltonii* and *D. asper*. Of the four methods tried, salting (dry & wet) are scientific versions of the traditional preservation methods that could be well adopted for industrial scale processing even at the small or cottage levels. Drying using mechanical driers are dependent on electrical power and are energy intensive at large scale operations. The acceptability of the dried product in the market would also pose a challenge. Canning, though a well established process, is capital intensive and owing to the high costs of the packaging material results in a high priced canned product, which would have to be targeted for sale in large cities and exports.

# *Chapter –VII*

# *Packaging*

## Packaging Of Bamboo Shoot

Packaging of the processed products is an important consideration to be made for the adequate storage life for the preservation of the processed products before the end user consumes them. The packaging also determines the price of the end product and consequently their acceptance by the larger group of consumers.

The packaging of both the fresh (raw) and the processed Bamboo Shoot was evaluated for the various packaging options available and its performance during storage.

## Approach Methodology

The packaging materials decided upon for processed Bamboo Shoot, keeping in mind their intended end users, and the mode of preservation method employed, were the following:

Packaging Material Selection Criteria[3]

| Processing Method | End User/Markets | Packaging Material |
|---|---|---|
| Dry Salting | Local & native population | ▪ Food grade plastic film based pouches<br>▪ Cryovac film based pouches<br>▪ PET Jars |
| Wet Salting | Local & native population | ▪ Food grade plastic film based pouches<br>▪ Cryovac film based pouches<br>▪ PET Jars |
| Canning | Specialty Restaurants<br>Export | ▪ Open top sanitary cans |
| Drying | Specialty Restaurants<br>Export | ▪ Food grade plastic film based pouches<br>▪ Cryovac film based pouches |

**Packaging Materials**

The details of the packaging materials selected for carrying out the trials are listed along with their detailed specifications as below:

- Cans - A 2½ Lacquered, open top sanitary cans. The cans used were of type open top sanitary cans having inside GL/ARL B/UP can with ARL ends of size 401 mm x 411 mm.
- Plastic Jars: The plastic jars used were of PET nature of different sizes and styles having leak proof screw cap closures.
- Glass Bottles: Plain glass bottles of 100 ml capacity with Lug caps having coated with epoxy from inside and enamel printing on the outside.
- Flexible Pouches: Polypropylene pouches of 100 gauge, Nylon based Natural Pouches, EVOH based white pigment pouches.Cryovac film pouches with specifications 15 micron biaxial nylon / 51 micron LLDPE.

**Packaged Products**

The list of the products prepared and packed under this study are as below:

- Bamboo Shoot (tidbits) in brine in A2½ Cans
- Bamboo Shoot (tidbits) in brine in Pet Jars
- Bamboo Shoot (Slices) in brine in Pet Jars
- Bamboo Shoot – Dried
- Bamboo Shoot (tidbits) Salted
- Bamboo Shoot (Slices) Salted
- Bamboo Shoot (tidbits) in water in Pet Jars
- Bamboo Shoot (tidbits) in water in A2½ Cans
- Bamboo Shoot (tidbits) in brine in EVOH, PP, and Nylon based flexible pouches
- Bamboo Shoot (tidbits) Salted in EVOH, PP, and Nylon based flexible pouches
- Bamboo Shoot (tidbits) in brine and salted in Cryovac film under vacuum packing

**Conclusions**

The canned products were accepted on completion of the cut out test of the cans. The product was better that the ones commercially available in the supermarkets in Bangalore of imported origin, in terms of the flavour, mouthfeel and texture. The canned product was accepted after 100 days of packing.

The dried products were acceptable after 30 days of storage. Due to lower volumes of initially packed material, the test could not be carried beyond 30 days of storage.

The dry salted and brined (wet salted) products have shown very encouraging results in all the plastic flexible pouches that they were packed in, after 12 weeks of storage. The colour, texture and flavour were retained in the packed products. The vacuum packed products were superior in quality over the other two packs.

Our conclusion of the storage of the processed products is that the plastic flexible pouches can be used for packaging dried, brined or salted products for 3 to 4 months without loss in quality.

# *Chapter –VIII*

# *Business Opportunities*

After having evaluated the various aspects of the edible Bamboo Shoot with respect to their availability, distribution, markets, processing technologies, nutritional qualities and an understanding of the consumer's acceptance of the Bamboo Shoot incorporated into a variety of dishes, it is but appropriate to evaluate the existence and possibility of a business opportunity for edible Bamboo Shoot. The findings of the market survey, user evaluation, and process study are to be analyzed to identify and pin point a business opportunity for Bamboo Shoot.

**Business Concept for the North East Region[Page 25,Delphi(2011)]**

The maximum potential for procurement of Bamboo Shoot appears to be the North East Region for the following reasons:

- Maximum standing forest stock of Bamboo
- Generally high rainfall leading to good growth
- Large potential for homestead or planned cultivation
- Longest shooting season

However, the region also suffers factors like from large distance from the urban markets, high transportation costs and difficulties in logistics management limitations. For these reasons it is felt that the business model for these areas can best be addressed at two levels.

- Small decentralised units with a typical processing capacity of 200 tpa of Bamboo Shoot.
- Larger plants with a minimum capacity of 600 tpa of Bamboo Shoot.

These smaller plants would be located in proximity to the collection areas so that the lead time between harvesting and processing is minimized. The processed products can be bulk packed and stored. The bulk packs can be transported to a centralized retail packing plant.

In the case of the larger plant, it can either be close to the collection area so as to accumulate bulk packed products for retail packing round the year or it can be close to a port or a surface transport hub so that it can receive the product from small processors in bulk packs and focus on the retail packing and product marketing activities.

In other Bamboo growing areas such as the Western Ghats in Karnataka, there is a greater pressure on the forest stock and hence it would be feasible to operate a shoot processing plant only in areas where there is organized cultivation or extensive homestead planting. At present no such activity is reported in sufficient degree to support the installation of a processing plant at this time. However, if the cultivation acreage increases substantially a processing plant could follow in about 4 to 5 years hence.

**Small Plant**

Small units that would process and pack harvested Bamboo Shoot from a limited forest area, estimated to be about 300 to 400 acres of forest land, are proposed to be set up

at the village or cottage level. The annual production capacity estimated for this unit is about 200 TPA.

The unit would primarily carry out the salting preservation of Bamboo Shoot and pack in bulk as an intermediary product and retail packs for the local markets. The intermediary bulk production becomes necessary as the Bamboo Shoot is highly a seasonal crop and substantial quantities would require to be handled in a short span of time. The bulk production would be carried out during the season and then repacked in to retail packs throughout the year for the local markets.

Some of the bulk production would also be sold to the large processing plant.

**Large Plant**

A large plant that would process and pack Bamboo Shoot in retail packs of salted, brined and canned products, primarily for the high end markets in other parts of the country and for exports. The estimated annual capacity of this unit is 600 TPA.

This unit would source its requirement of the fresh Bamboo Shoot partly from the smaller units too apart from the collection from the surrounding forests. The unit would process bulk products during the season and repack in retail packs throughout the year. This unit would also produce canned products for the high end markets and exports.

**Conclusions**

As for any industry proximity and availability of substantial quantum of raw material is a pre-disposing factor for its implementation, same is the case for Bamboo Shoot too. The processing units for Bamboo Shoot have to be placed in nodal area of extensive Bamboo growing areas. Owing to the large expanse and spread of the Bamboo distribution in the NE, many smaller units processing Bamboo Shoot have been suggested.

A large unit catering to the larger markets & exports with a multi product range has also been suggested.

# *Chapter –IX*

# *Case Study*

**Introduction to the case**

Aspiring entrepreneurs may have an idea about the type of fruit or vegetable product that they would like to make. This can come from seeing others successfully producing a food and wanting to copy them or from talking to friends and family members about products that they think they could make. However, an idea for a business is not a sufficient reason to begin production straight away, without having thought clearly about the different aspects involved in actually running the business. Too often, people invest money in a business only to find out later that there is insufficient demand for the product or that it is not the type that customers want to buy. To reduce this risk of failure and losing money, potential producers should go through the different aspects of running their business in discussions with friends and advisers before they commit funds or try to obtain a loan. This process is known as doing a feasibility study and when the results are written down, the document is known as a business plan.

**Data Collection Sources/Techniques**

**Secondary + Primary Data(Guesstimate)**

**Market share and competition**

Market surveys and the calculation of market size and value are important to find out whether the demand for a product really exists, but these figures should not be assumed to represent the scale of production that could be expected. Even if no-one else is currently making a product locally, it is likely that once a new business starts production and is seen by others to be successful, they too will start up in competition. It is therefore important from the outset, to estimate what is the proportion of the total market that a new business could reasonably expect to have. This is known as the *market share*. It is often difficult to estimate a realistic market share and the figure depends on a large number of variables.In many cases, new entrepreneurs over-estimate the share that they could expect, with the result that production operates at only a small proportion of the planned capacity. The lower percentages should therefore be used initially.

In the example described concerning the market for bamboo shoots food products, there were a large number of small producers all making similar products. The estimated share of the market for a new producer can therefore be calculated as follows:

Total size of the market = 14,400 kg per month
Estimated share(which I am planning to capture initially) = 41-45%.
This represents sales of 5904 kg of bamboo shoots per month

When converted to daily production rates, assuming 22 working days per month, the maximum production is therefore 268 kg per day

This figure for daily production rate is very important. It is central to all subsequent calculations of production capacity and investment requirements (below) and every care should be taken to ensure that this information is as accurate as possible.

Competitors are very important to the success or failure of a new business and the entrepreneur should recognise that there are different types of competitor. Using the example of someone wishing to make fruit juices, it is helpful to think how the consumers might view the available products: for example when they are thirsty, they have a choice of hot drinks (tea, coffee etc.), cold soft drinks, such as milk, juices, squashes or finally alcoholic drinks. These are all *general competitors*, who are able to satisfy the consumers' thirst. Supposing the consumers choose cold soft drinks that can be drunk straight from the bottle, they then have a choice between carbonated (fizzy) soft drinks, and juices. These are known as *type competitors* or different kinds of soft drink. Finally, on choosing juices, there are different juices and different brands of the same type of juice, which are*brand competitors*.

Although the appearance and quality of foods are important, competitors do not just compete with their products. They also compete with the profit margin and level of service that they offer to retailers and with special offers or incentives to customers. New entrepreneurs must therefore assess each of these factors when deciding what the competition is and how to deal with it. This is conveniently done using a *SWOT analysis*, where SWOT stands for Strengths, Weaknesses, Opportunities and Threats.

The technique involves looking at each aspect of the new business and comparing it to other producers, particularly type and brand competitors.

Many new entrepreneurs do not appreciate the importance of finding information about competitors and even if they do, they may not know where to find it. In addition to the direct questions to consumers in market surveys described above, entrepreneurs can get information about competitors from the following sources:

1. Discuss with retailers the amount of sales of different brands and any seasonality in demand. What are the trends in consumers' buying, what is getting popular and what is going down? What types of consumers buy particular products and how often? Does the retailer put on any special displays for some suppliers? What do they think about the idea for a new product and do they think they will sell a lot of it? What are their plans for the future?

2. Look at competitors' advertising and retail displays, get a copy of their price lists.

3. Ask the local Employer's Federation or Chamber of Commerce for any information they have on the market for similar products.

4. Visit trade fairs and talk to other producers and their customers.

5. Look in trade journals, manufacturers' association magazines and newspapers for information about the market and the activities of competitors.

**Estimates of market share for a new food business with different levels of competition**

| No. of other producers | Many | | | | Few | | | | One | | | | None |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Size of competitors** | **Large** | | **Small** | | **Large** | | **Small** | | **Large** | | **Small** | | |
| **Product range** | **S** | **D** | **S** | **D** | **S** | **D** | **S** | **D** | **S** | **D** | **S** | **D** | |
| Market share (%) | 0-2.5 | 0-5 | 5-10 | 10-15 | 0-2.5 | 5-10 | 10-15 | 20-30 | 0-5 | 10-15 | 30-50 | 40-80 | 100 |

S = similar products, D = dissimilar products

(From Do Your Own Scheme, Anon)

After finding as much information as possible, the entrepreneur can then start to compare the new business with those of competitors using the SWOT analysis.

When it is completed, the entrepreneur should be able to answer the following questions:

- who is producing similar products?
- where are the competitors located?
- what is the quality and price of their products?
- what can I do to make a new product that is better than those of competitors?
- why would customers or consumers want to change to a new product?
- what offers or incentives do competitors give to retailers?
- what are competitors likely to do if a new product is introduced?

The answers to these questions are then used to formulate a marketing strategy.

The analysis indicates that one competitor (A) has a range of good quality products that are packaged and promoted well, but they are more expensive and do not meet changing consumer requirements. The other competitor has a cheap product that is not well packaged and not promoted. However, it sells well because the low price attracts low income consumers and retailers promote it because of the higher margins offered by the company. They appear to be expanding to new areas. However, retailers are annoyed when Competitor B fails to deliver on time or in the correct amount and they may have over-stretched their distribution capacity. The analysis points the way to producing a product without additives and to providing a good service and equivalent margins for retailers. It also highlights lack of information about process inputs (e.g. packaging) and production costs. These are discussed in the Sections below.

# *Chapter – X*

# *Desirability and Feasibility Analysis*

Two key questions that encompasses my study are –

1. Desirability of bamboo shoots – Is the market in Delhi/NCR really favorable for this product to enter?[Page 115,D.J.(2007)]

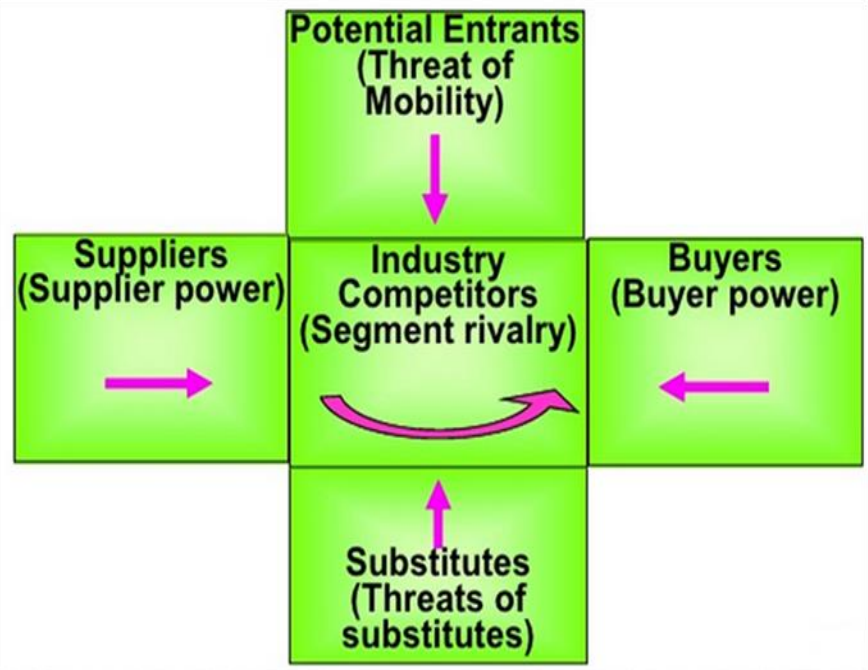
2. Feasibility – Even if the bamboo shoots market is attractive, do I have enough resources to be capable of doing business in Delhi/NCR? [Page 115,D.J.(2007)]

**Desirability analysis**

Is bamboo shoots market attractive in Delhi/NCR?

**Step - 1**

**Porter Five forces is the first component of conducting the desirability analysis – This framework captures the spirit of market dynamics, by essentially covering competitors, Suppliers and the customers.**




*Unless we have right set of customers, non threatening competition and suitable supplier market, proposal to enter the market sounds week.*

**Threat of New entrants**

Capital-intensive start up cost can prove to be a barrier to entry despite various government schemes to promote bamboo plantations.
Good operating Skills and management experience is fairly scarce,making entry even more difficult.
Mandatory regulatory approval and ownership of license.

**Power of Suppliers**

Without proper machinery and related assets the plantation owners would not be able to meet the supply-demand equilibrium.
There are actually a number of large equipment makers around, to dilute bargaining power.
The limited pool of talented managers and engineers, especially htose well vested in the latest technologies, places owners in a weak position in terms of value added operations and waste reduction.

**Competitive Rivalry**

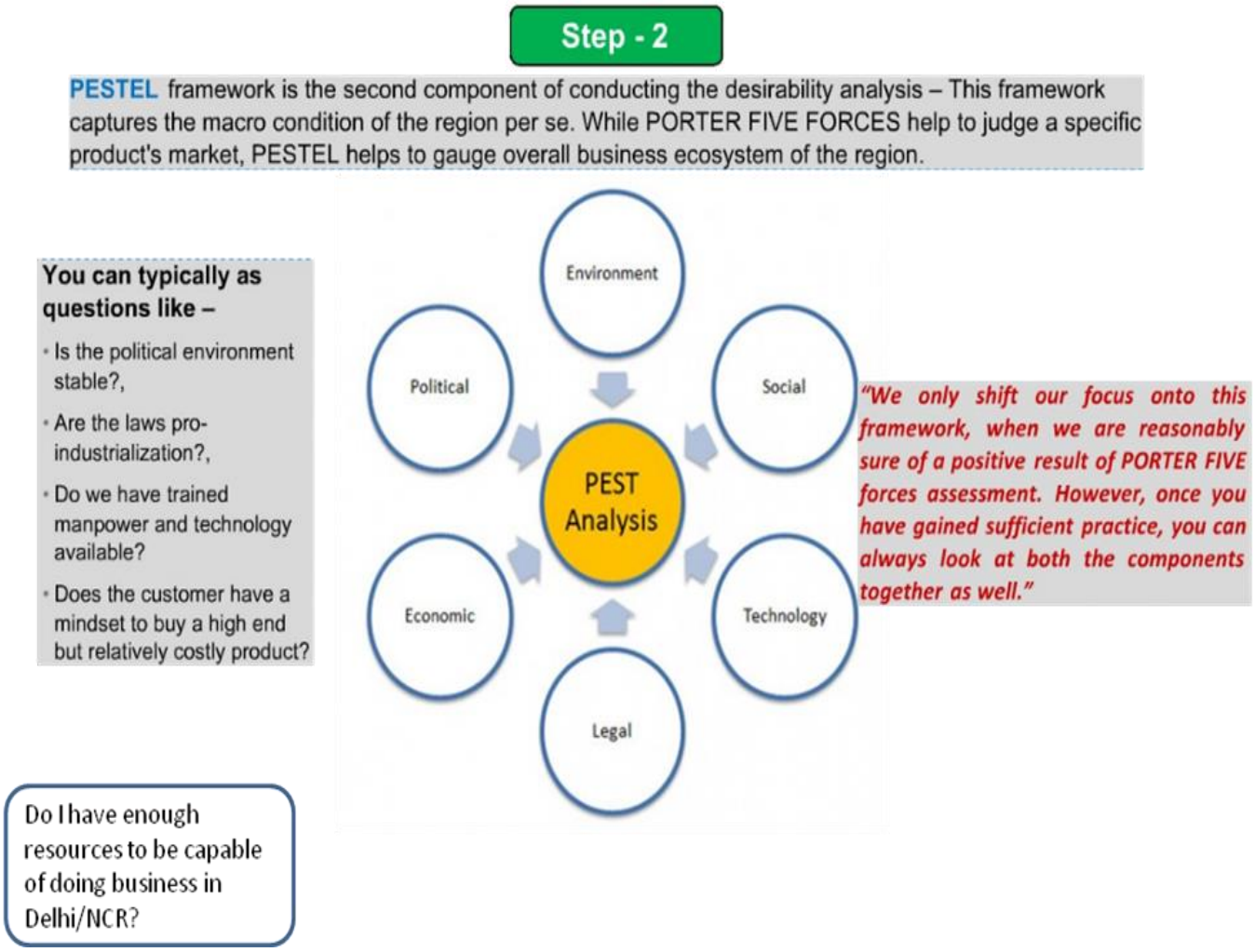
New technology is prompting raft of substitute services and product differentiation, so existing competitors now must lure competitors with lower prices nad more exciting services.
But for existing players the liquidation of obscolete equipment is pretty difficult. Hence its not easy for them to shift to modern technology.

**Power of Buyers**

Not much product differentiation is possible except packaging and customized quantity, so focus is on better services.
Customers(Chinese cuisines, caterers, specialty restaurants, high-end hotels) seek low prices with reliable services.
Switching costs are low for customers, but are higher for large business customers, especially those that rely more on customized products and services.

**Availability of Substitutes**

Its a niche product line so no considerable substitute food items are available.
Its also used to marinate onions in salad instead of vinegar.




**Political**

**Planning Commission's Focus on Bamboo**

Bamboo, traditionally considered as the "poor man's timber" in India, is under consideration as a major export item by the Indian Government for a global market valued at Rs.500 billion (US$ 11.9 billion) and producing as much as 20 million tonnes of varied products a year from China alone.

India almost 20 years behind China in commercial production, produces only 3 million tonnes a year. The government has lately come to regard bamboo as an easily manageable export item that provides high yields, has lots of uses and has the potential to provide employment for millions, and thus stem rural workers flight to India's teeming cities.

Between them, India, China and Myanmar have 19.8 million hectares of bamboo reserves – 80 percent of the world's bamboo forests. Out of this India's share is 45

percent, with nearly 125 different species of the plant, but only 4 per cent of its global market. The government would like to see its bamboo industry, concentrated in the northeast of the country, take 27 percent of the world market by 2015. By that time, the market is expected to be Rs.950 billion.

India's aspirations are ambitious indeed. The government hopes to create 8 million jobs in the bamboo industry, lifting 5 million families out of poverty and earning Rs.160 billion in revenues by the end of its Tenth Plan in 2007. The government also hopes to slow the flight of rural workers to urban areas, a major problem. Job losses and low pay for day workers in national forests affect large populations, where the government forestry departments manage over 9.61 million hectares of mostly natural bamboo stands.

In this backdrop the Planning Commission of India had launched the National Mission on Bamboo Technology and Trade Development. The objectives of this Mission were to launch several initiatives to place bamboo as a key species and research in the developmental agenda. The principal objectives are :-

To use Bamboo as a means to reclaim degraded land, conserve soil, improve environment, carry out drought proofing. Bamboo plantation could be an important ingredient in Greening India Programme aiming at raising of the forest cover to 25% by 2007 and 33% by 2012;

To expand area under Bamboo plantation by 2 million ha. in the Tenth Plan – (1 million ha. in forest areas and 1 million ha. in areas outside forests) and overall 6 M.ha. in the Tenth and Eleventh Plan;

To improve, yield and stabilize the existing bamboo plantation;

To diversify, modernize and expand the bamboo based industries and handicrafts by application of modern technology and provide policy and financial support;

To use Bamboo development as an instrument of poverty alleviation and employment generation particularly in rural sector;

The Planning Commission,Govt.of India took note of the market survey carried out by the Cane & Bamboo Technology Centre (CBTC), Guwahati and have accordingly focused on the following :

Bamboo as food (Bamboo Shoots);

Bamboo as a wood substitute (Bamboo Plywood, Bamboo Flooring, Bamboo Pulp, Bamboo Furniture, Bamboo as a building and construction material, Bamboo Housing, Bamboo in tiny and Cottage Industries, Bamboo Mats Industry etc.)

Among the key initiatives launched by the National Mission on Bamboo Technology and Trade Development is "Manpower Development and Training". Human Resource

Development implies upgradation of skills of craftspersons as well as growth of entrepreneurship.

**Economical**

Bamboo is endowed with several features such as fast growth, high total biomass production, low input costs and a capacity to provide yield in 4-5 years. It can provide steady annual returns for over 30 years and has the potential to be the raw material for a variety of industries. It is emerging to be a viable crop.
In India, bamboo, which is traditionally considered the `poor man's wood', and labelled as `green gold' is being considered a major export item by the centre for the global market, valued at about Rs 50,000 crore. The annual turnover of the bamboo sector in the country is estimated to be around Rs 2,500 crore.[1]
The real benefits accrue from value-added products. Handicrafts (mats, baskets, tools, toys and utensils) and furniture are established possibilities, produced in finished form or supplied as components to small enterprises for further processing (for example, supply of mats for production of bamboo mat board). There are emerging industrial and large-scale applications too in the manufacture of wood substitutes and composites, energy, charcol and activated carbon. Building and structural components represent vast possibility for enterprise, value addition, income and employment.

**Technological**

Technology revolves around 'Artisanal Production system'. The role of bamboo in community agroforestry as a means of generating income for the rural poor is very important.
**Yield and Harvesting:** The annual yield in tonnes/ ha depends on the environment as well as the species. It is generally 3-4 tons/ha as understory in forest and 5-12 tons/ ha from plantations. In the drier parts of India, well managed and technology based *D.strictus* plantations give yield of 10 tons/ha. *Melocanna bambusoides* in moist Bangladesh has produce 10-13 t/ha yield. Well managed monoculture bamboo plantations in China yield up to 50 ton per/ha/year. It is estimated that almost 25% of the biomass in the tropics and 20% in the subtropics, come from bamboo.[3]
**Cultivation:** Bamboos are generally propagated vegetatively, although they are best raised through seeds. Seedlings are raised in nursery beds and allowed to develop for a year in poly pots after which they are transplanted in the field. As bamboo seeds are rarely available, they are propagated through rhizomes or culm cuttings. In rhizome planting, one year old culms with roots are dug up, cut to about a metre high and planted during rainy seasons. Vegetative propagation of bamboos is an age old method and is practised everywhere. While planting the rhizomes, the workers should take extra care not to injure the junction of the culm and the rhizome. Irrigation is necessary after planting.

**Environmental**

**Ecological security**, by conservation of forests through timber substitution, as an efficient carbon sink, and as an alternative to non-biodegradable and high-embodied energy materials such as plastics and metals.[2]
Bamboo cultivation can also play a major role in stabilisation of the environmental problems. Deforestation, followed by increased carbon dioxide emission, is one of the major concerns of environmentalists. The cultivation of bamboo as a wood substitute helps to offset depletion of the rain forest. Its rapid growth ensures an effective reconstruction of damaged eco systems as bamboo generates 30 per cent more oxygen than other trees.

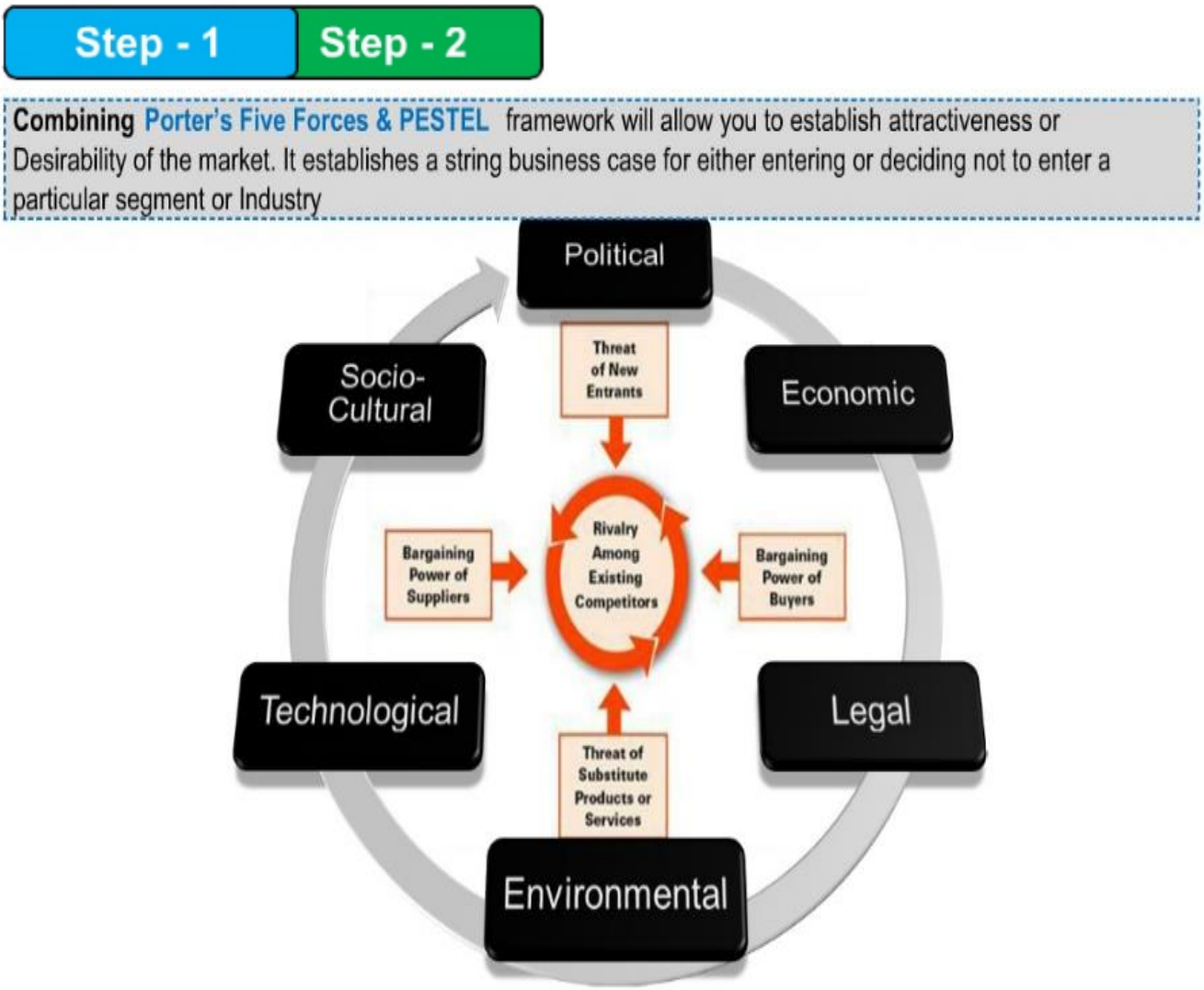
**Socio-cultural**

Bamboo is well placed to address four major global challenges :

**Shelter security**, through the provision of safe, secure, durable and affordable housing and community buildings.

**Livelihood security**, through the generation of employment in planting, primary and secondary processing, construction, craft and the manufacture of value-added products.

**Food security** through bamboo-based agro-forestry systems, by maintaining the fertility of adjoining agricultural lands, and as a direct food source – example,edible bamboo shoots.




**Technical feasibility[4]**

Once an entrepreneur has found information about potential consumers, their requirements and the likely share of the market that could be obtained for a new product, it is then necessary to assess whether production at this scale is technically feasible. The series of questions below is helpful in deciding the technical requirements of the business:

 are enough raw materials available of the correct quality when needed for year-round production?

 is the cost of the raw materials satisfactory?

 is the correct size and type of equipment available for the expected production level and at a reasonable cost?

 can it be made by local workshops and are maintenance and repair costs affordable?

 is sufficient information and expertise available to ensure that the food is consistently made at the required quality?

 are suitable packaging materials available and affordable?

 are distribution procedures to retailers or other sellers established?

 is a suitable building available and what modifications are needed?

 are services (fuel, water, electricity etc.) available and affordable?

 are trained workers available and are their salaries affordable?

**Example of a SWOT analysis of a new business in relation to competitors**

| | **My proposed business** | **Competitor A** | **Competitor B** |
|---|---|---|---|
| Strengths | Production likely to be sited close to retailers can deliver at short notice. | Good brand image and range of products. | Product is cheaper than A and sells well They offer good margin to retailers. |
| Weaknesses | Difficult to find good packaging. | Products more expensive than B. Uses synthetic colours and preservatives. | Poor quality product, poor label design. I'm told by retailers that supplies are irregular and not always the amount ordered. |
| Opportunities | Retailers say demand for products without additives is increasing. I can produce without added colours. | | Appears to be expanding deliveries to new areas according to newspaper reports. |
| Threats | Strong promotion by A. There are few wealthy consumers and price is most important factor. I am not yet sure of production costs. | Cheaper products than B. | May have over-expanded distribution network and failing to make deliveries. |

(Adapted from: *Starting a Small Food Processing Enterprise*, by Fellows, Franco and Rios)

## Production planning

This plan should indicate how the different stages in a process are linked together, identify any 'bottle-necks' in the process, the equipment that is required for each stage and where quality assurance procedures should be used. The data that has been found from market surveys is added to the process chart to indicate the scale of production that is required.

The chart is also used for planning a number of different aspects of the production process, including:

1) the weights of raw materials and ingredients that should be scheduled each day,
2) the number of workers and their different jobs,
3) the size of equipment required to achieve the planned throughput of product
4) the number of packages that are required each day.

In the report, the market information for bamboo shoots sales indicated that a minimum production rate of 36 kg per day would be needed to meet the anticipated initial market share. Assuming that production takes place for 8 hours each day for 20 days per month, the average throughput would be 4.5 kg per hour (36/8 kg). This throughput is critically important in all subsequent planning and every effort should be made to ensure that it is as accurate as possible by checking all assumptions carefully. In particular, the number of assumed working days may fall below twenty if there are regular power failures or if production planning is inadequate. The different stages of production planning are described below.

### Modified process chart showing scale of operation and daily requirements for bamboo shoots food products production

| Processing stage | % losses | Weight of bamboo shoots (kg) | Batch size (kg) | Processing time (in minutes) | No. of workers | Minimum equipment size (kg/hr) |
|---|---|---|---|---|---|---|
| Bamboo shoots | 0 | 268 | | | | |
| Wash | 1-4 | 265 | | | | |
| Sort | 4-5 | 262 | | 90 | 2 | Table for 2 workers |
| Peel/destone | 0 | 262 | | | | |
| Cut | | 262 | | 120 | 3 | Table for 3 workers, 3 knives |
| Mix | 0 | 262 | 260 kg sugar + 13.51 vinegar for batch of 286 kg. | | | |
| Boil | 3-4* | | 260 | 180 | 1 | Boiling pan for 10 kg batches. Two filters and heat sealers. Table for |
| Fill/seal | 3-4 | | 260 | 180 | 2 | |
| Cool/label | 0 | | 260 | 120 | 1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Store | 0 | | 260 | | | 2 people |
| Weight of product | | | 260 | | | |

* evaporation losses during boiling.

Notes on calculations:

Boiling results in weight losses of 34% as water is evaporated and the solids content increases to 70% (see calculation below). If each batch takes 20 minutes to boil, there are 2 batches per hour and in 3 hours there are 6 batches of 45 kg each to meet production target of 268 kg of raw materials, yielding 260 kg of product per day. Therefore the boiling pan should have 45 kg working capacity (that is a 12-15 litre pan).

Each worker fills and seals 40 bags per hour = 120 bags per day x 2 workers = 240 bags of 1.1kg net weight = 260 kg per day

**Weights of raw materials and ingredients**

There are two stages involved in planning the amounts of materials that are needed to produce the required weight of product: first, it is necessary to calculate the amount of each ingredient that will be needed to formulate a batch of product and secondly, it is necessary to calculate the amount of losses that can be expected during preparation of fruits and vegetables.

The processor should experiment with different mixes of ingredients (the 'formulation' or 'recipe') to produce a product that has the colour, flavour, appearance etc. that consumers say they prefer from market research. Skill and flair are needed to achieve this, using the combination of ingredients that has the lowest cost. It is important to weigh each ingredient carefully and make sure that all weights are recorded for each formulation that is tried.

Otherwise, the inevitable result is a successful trial product, but no information is recorded to enable it to be repeated. Once a formulation has been successfully developed, great care is needed to ensure that it is made in exactly the same way on every occasion. This requires staff training, especially for those staff involved in batch preparation, the implementation of quality assurance procedures and careful production control.

Nearly all fruit or vegetable processing results in losses of material. These may arise from peeling or de-stoning, from unsatisfactory fruits and vegetables that are thrown away during sorting, from spillage during filling into packs or from food that sticks to equipment and is lost during washing. Different types of fruit and vegetables have been found in practice to have different levels of wastage.Typical losses from other sources in a well-managed production process are shown in Table below. However, it is necessary for an entrepreneur to do trials to calculate the actual amount of wastage experienced with the particular varieties of fruit or vegetable and with the particular process that are being used.

Clearly, it is in the interests of the processor to reduce losses as much as possible. Contracts with reliable suppliers help to ensure lower levels of poor quality raw materials and therefore reduce losses. Additionally, a well-managed processing operation, having good quality assurance procedures, also reduces wastage, especially during later stages of a process when the product has a higher added value.

Using the data from experimental production trials, or less desirably estimates based on data, it is necessary to calculate the amount of raw materials and ingredients that are needed to produce the required weight of product each day. This will also enable the true cost of raw materials to be calculated for use in financial planning.

**Typical losses during the preparation of selected fruits and vegetables[1]**

| Fruit or vegetable | Typical losses during preparation (%) | Notes |
|---|---|---|
| Apples | 23 | peeled & cored |
| Apricot halves | 12 | Destined |
| Bananas | 41 | Peeled |
| Cabbages | 30 | |
| Carrots | 4 | (bought without leaves) |
| Cauliflowers | 38 | |
| Currants | 3 | seeds & skins removed |
| Figs | 2 | |
| Grapes | 19 | skins & pips removed |
| Guava | 22 | |
| Lemons | 40 | peel & seeds removed |
| Mangoes | 45 | peeled & destoned |
| Melons | 42 | peel & seeds removed |
| Okra | 12 | |
| Onions | 3 | |
| Oranges | 25 | peel & seeds removed |
| Passion fruits | 58 | peel & seeds removed |
| Pawpaws | 38 | peel & seeds removed |
| Peas | 50 | bought in pods |
| Peppers – chilli | 15 | seeds & stalk removed |
| Peppers – green | 14 | seeds & stalk removed |
| Pineapples | 48 | peeled & cored |
| Plantains | 39 | Peeled |
| Tomatoes | 4 | seeds & skin removed |
| **Bamboo shoots** | 2 | Peeling |

(Adapted from data in *The Composition of Foods* by Paul and Southgate, and from field data collected by the author)

**Equipment required**

Using the process chart, the weight of food that should be processed at each stage is then calculated in kg per hour. This information then allows the processor to decide what equipment is required and the size (or 'scale' or 'throughput') that is needed. In doing this, decisions need to be taken on the relative benefits of employing a larger number of workers or buying machinery to do a particular job. In some enterprise development programmes, there may be wider social objectives of employment creation which may influence such decisions.

The decisions on equipment requirements are also influenced by:

- the cost and availability of machinery
- the availability of people who are skilled in
- maintenance and repair
- the availability and cost of spare parts and
- the possibilities of local equipment fabrication.

Information on the types and suppliers of equipment is often difficult to obtain, but catalogues and sometimes databases of equipment manufacturers and importers may be available at offices of national and international development agencies, Chambers of Commerce, university departments, food research institutes, embassies of other countries and trade or manufacturing associations.

**Typical Losses During Processing of bamboo shoots.**

| Stages in a Process | Typical losses(in %age) |
|---|---|
| Washing bamboo shoots | 0-2 |
| Sorting | 0-10* |
| Peeling | 5-10 |
| Slicing/dicing | 5-10 |
| Batch preparation/weighing | 2-5 |
| Boiling** | 5-10 |
| Drying** | 0-5 |
| Packaging | 0-5 |
| Machine washing | 5-10 |
| Accidental spillage | 5-10 |
| Rejected packs | 2-5 |

* Unsatisfactory raw materials depend on source and agreements with suppliers
** does not include evaporation losses

It is preferable wherever possible, to buy equipment from local suppliers and fabricators because servicing and obtaining spare parts should be faster and easier. However, if equipment has to be imported, the following points should be considered: when ordering equipment, it is important to specify exactly what is required, as many manufacturers have a range of similar products. As a minimum, it is necessary to state the throughput required in kg per hour and the type of food to be processed. Where possible other information such as the model number of a machine, whether single or three-phase power is available and the number and types of spares required, should also be given. Assistance from a food technologist working in a local university or food research institute may be required to research and order equipment. The quotations received from equipment suppliers can then be used when calculating financial viability (below).

**Packaging**

Similar considerations apply when ordering packaging materials as there is a very wide range available and there are a number of considerations that should be taken into account by the producer. These include the technical requirements of the product for protection against light, crushing, air, moisture etc., the promotional and marketing requirements and the relative cost and availability of different types of packaging. Selection of packaging materials frequently causes the largest problems for small producers and is often the main cause of delay in getting a business established. Professional advice should be sought from a food technologist or in some countries, packaging specialists or agents of packaging manufacturers.

**Staffing levels**

Decisions on the numbers and types of workers that are required to operate the proposed business are taken in conjunction with decisions on equipment procurement. Using the process chart, it is possible to break down the production into different stages and then decide the number of people who will be needed for each stage of the process. It is important also to include work such as store management, quality assurance and book-keeping when planning employment levels.

In bamboo shoots processing, each day's work will initially involve preparation of the raw materials and then move through processing to packaging. It is possible to have all workers doing the same type of activity throughout the day, but it is often more efficient to allocate different jobs to each worker as the day progresses. A convenient way of planning this is to draw an *Activity Chart*. This shows the type of work that is to be done each hour during the day, the number of people involved with each activity and the sequence of work that individuals will do during the day.

In the example of bamboo shoots processing, the total number of workers is estimated from the process requirements shown on the process chart. It is estimated that two workers will be able to wash and sort 60 kg shoots within ninety minutes. Similarly, it will require three workers to peel and slice this amount of fruit within two hours. Once sliced shoots becomes available (by around 9.30 am), one of the three workers (X) can begin

preparing the batches of ingredients and boiling the shoots. By 11.00 am, fruit preparation has finished and while one worker (Y) washes down the preparation area, the third (Z) labels the previous day's production and packs them into boxes ready for distribution.

In this plan, all workers have a lunch break at the same time, but in other types of process it may be more convenient or efficient to stagger each person's break at different times. As the first batch of product cools sufficiently, work can begin after lunch on filling and sealing it into 150g plastic bags. This is a time-consuming stage as manual filling and sealing have been selected. Additionally, packages require check-weighing to ensure that they contain the correct weight of product. It is calculated that three hours will be needed for two people to fill and seal 240 bags (60 kg). This time could be reduced if a mechanical filler/sealer was bought, particularly at a later time when the business expanded. In the example, the owner/manager (M) is involved with staff supervision, record keeping, finance management and product distribution/sales. In other plans, these jobs could be done by trained staff.

| | Hours during working day | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Activity | 8 am | 9am | 10am | 11am | 12pm | 1pm | 2pm | 3pm | 4pm | 5pm |
| Washing/ sorting | X<br>Y | | | | L | | | | | |
| Peeling/ slicing | | X<br>Y<br>Z | | | U | | | | | |
| Mixing/ boiling | | | X | | N | | | | | |
| Cleaning | | | | Y | | | Z | | | |
| Packing | | | | | C | Y<br>Z | | | | |
| Labelling | Z | | | Z | | | | | | |
| Store manage-ment | | | | | H | | | X | | |
| Distrib-ution | | | | | | | | | M | |
| Manage-ment | M | | | | | | | | | |

This type of chart is useful for assessing the time required to complete each stage of the process and for thinking through the problems that are likely to occur. When production begins, it can be used as a basis for training in each job and it should be constantly reviewed to optimise production efficiency.

In summary, the technical part of a feasibility study involves taking information about the expected demand from the market survey and calculating the process throughput required to meet that demand. This can then be used to decide on the type of

equipment, the level of staffing and the amounts of raw materials, ingredients and packaging that will be required. These are summarised below:

**Summary of technical feasibility calculations for bamboo shoots production**

| Information required | Data obtained |
|---|---|
| Estimated market size (kg/month) | 14,400 |
| Estimated share of market | 41-45% |
| Production required per month to meet market share (kg) | 5904 |
| Production required per day @ 22 days' work per month (kg) | 268 |
| Minimum Process throughput @ 8 hours per day (kg/hr) | 33 |
| Weight of bamboo shoots required per day (kg) | 268 |
| Losses on arrival due to sorting (%) | 1-2 |
| Amount of losses in the process (%) | |
| - wastage/spillage | 0-1 |
| - peeling losses | 0-1 |
| - mixing losses | 0-1 |
| - packing losses | 0-1 |
| - evaporation losses during boiling (%) | 0-1 |
| Minimum size required (kg/hr) for | |
| washing/sorting | 268 |
| peeling/slicing | 265 |
| boiling (2 batches of 10 kg per hour) | 262 |
| packing (bags per person per hour) | 260 |
| Number of people required to operate the process | 3 plus owner/manager |

**Financial Feasibility**

Having completed the study of technical feasibility, the entrepreneur should then have sufficient information to determine the costs that are likely to be involved in production. Additionally, the market survey will have supplied information about the sale price that could be achieved for the new product. The entrepreneur is therefore in a position to calculate the expected income and expenditure and hence the gross profit that can be achieved.

**Start-up costs[Page 135, D.J.(2007)]**

When a new fruit and vegetable processing business is started, it is likely that money will be required to buy or convert a building and buy equipment to start production.

Additionally, it is necessary to buy a stock of packaging materials and the initial raw materials and ingredients. The *start-up capital* is the amount of money that is needed to buy the facilities and equipment, to register and licence the business and get the necessary hygiene certificates.

*Working Capital* includes the costs of raw materials, packaging, staff training, product promotion etc. that have to be made before the business begins to generate income from sales of the product. The requirement for working capital also continues as the business develops and is discussed further under 'Cashflow' below. A fruit and vegetable processing has relatively high requirements for working capital compared to other types of food processing. This is because of the seasonal nature of crop production and the need to buy several month's supply of crops during the season and part process them so that production can continue for a larger part of the year.

The start-up capital and initial working capital are calculated to determine whether the entrepreneur's savings (known as the *owner's equity*) will be sufficient to start the business without a loan. The start-up costs are estimated below, using representative data from the area under concern:

**Product**

Tender bamboo shoots are used in many down the line food preparations and are consumed regularly by many households. **Compliance under PFA Act is mandatory.**

**Capital Inputs**

**Land and Building**
Land requirement will be 200 sq.mtrs. which would cost around Rs. 60,000/-. Requirement of built-up area would be around 75 sq.mtrs. for main factory building including packing and store area whereas balance 25 sq.mtrs. would occupy space for cutting, chopping, grading and washing of bamboo shoots. This space would have two water tanks of around 500 ltrs capacity. The average cost of construction is taken as Rs. 2,500/- per sq.mtr. The total cost of civil work would be Rs.2.50 lacs.

**Plant and Machinery**
The total cost of machinery would be Rs.3.50 lacs which would include boiling vessels, oil fired furnace with burners, canning machine, flanger, evaporation boxes, retort and weighing scales. With the help of this set of machines the annual processing capacity would be 180 tonnes per shift.
Canning facilities can be utilised for canning fruits and vegetables during lean season when bamboo shoots will not be available in sufficient quantity. This would give a further boost to profitability.

**Miscellaneous Assets**

Some other assets like furniture & fixtures, cutting knives, plastic baskets, packing tables, storage racks etc. shall be required for which a provision of Rs. 50,000/- is sufficient.

**Utilities**

Power requirement shall be 15 HP whereas per day water requirement would be 700-850 ltrs.

Furnace oil of around 50-60 ltrs. will be required every day.

**Raw and Packing Materials**

The most important raw material will be bamboo shoots. In any case, the annual requirement even at rated capacity will not be more than 180 tonnes and there will not be any difficulty in procurement. Salt requirement will not be much. Tin cans will be required in large quantity depending upon packing size for which prior arrangements are required. Likewise corrugated boxes will be required for final outer packing.

## Manpower Requirements

| Particulars | Nos. | Monthly Salary (Rs.) | Total Monthly Salary (Rs.) |
|---|---|---|---|
| Plant Operators | 2 | 3,000 | 6,000 |
| Skilled Workers | 4 | 2,250 | 9,000 |
| Helpers | 6 | 1,250 | 7,500 |
| Salesman | 1 | 2,500 | 2,500 |
| | | **Total** | **25,000** |

### TENTATIVE IMPLEMENTATION SCHEDULE

| Activity | Period (in months) |
|---|---|
| Application and sanction of loan | 2 |
| Site selection and commencement of civil work | 2 |
| Completion of civil work and placement of orders for machinery | 6 |
| Erection, installation and trial runs | 2 |

### DETAILS OF THE PROPOSED PROJECT

## Land And Building[2]

| Particulars | Area (Sq.Mtrs) | Cost (Rs.) |
|---|---|---|
| Land | 200 | 60,000 |
| Building | 100 | 2,50,000 |
| | **Total** | **3,10,000** |

**Machinery[2]**

As spelt out earlier, the total cost of machinery will be Rs.3.50 lacs.

**Miscellaneous Assets**

A provision of Rs.50, 000/- is sufficient under this head as discussed before.

**Preliminary & Pre-operative Expenses**

There will be certain pre-production expenses like registration, establishment and administrative charges, market survey expenditure, interest during implementation, trial run expenses for which an amount of Rs. 75,000/- is earmarked.

**Working Capital Requirements**

As against the rated capacity of 180 tonnes, the plant is assumed to run at 60% in the first year for which following funds shall be required.

(Rs. in lacs)

| Particulars | Period | Margin | Total | Bank | Promoters |
|---|---|---|---|---|---|
| Stock of Packing Materials | 1 Month | 30% | 0.65 | 0.45 | 0.20 |
| Stock of Finished Goods | ½ Month | 25% | 0.90 | 0.68 | 0.22 |
| Receivables | ½ Month | 25% | 1.10 | 0.85 | 0.25 |
| Working Expenses | 1 Month | 100% | 0.50 | -- | 0.50 |
| | | **Total** | **3.15** | **1.98** | **1.17** |

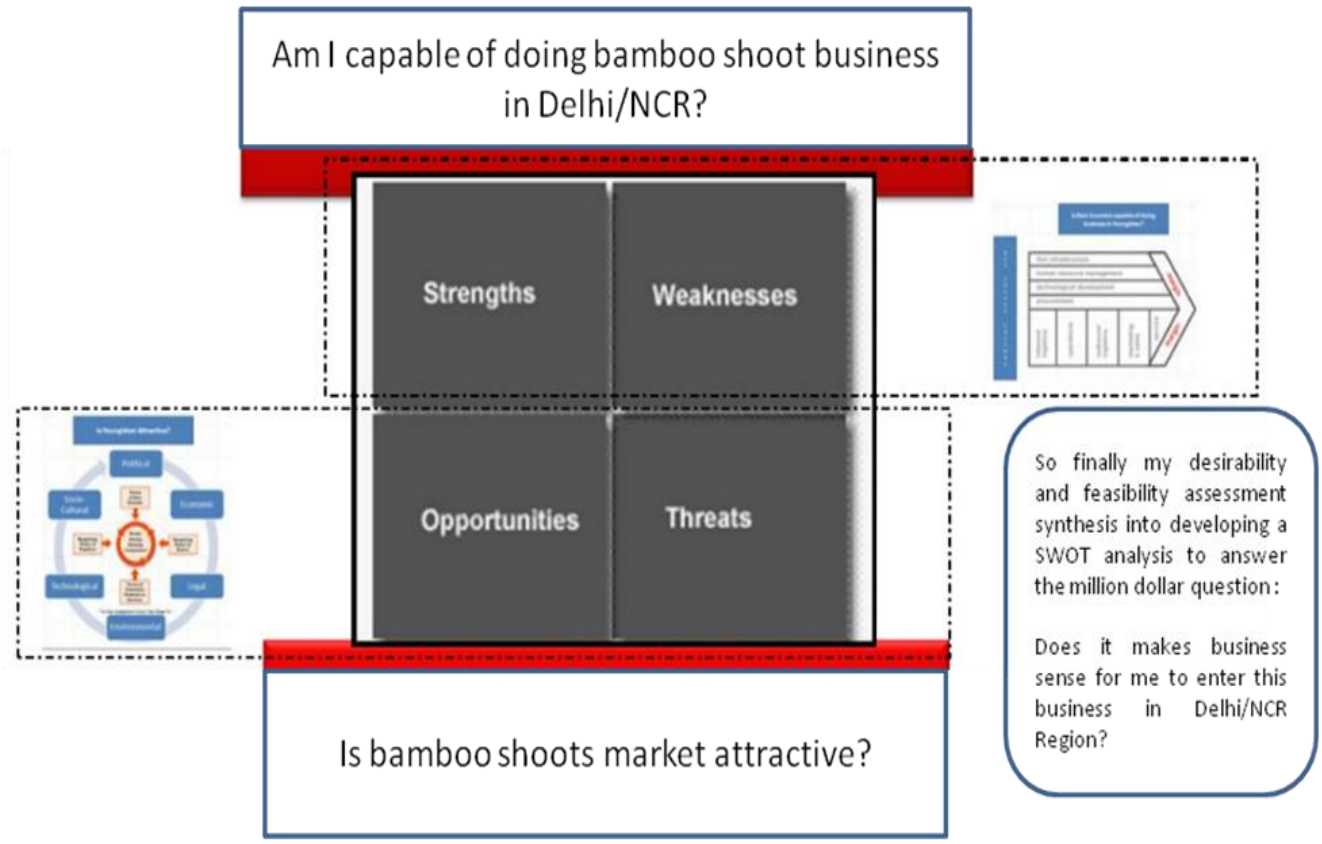
## Cost of the Project & Means of Financing

(Rs. in lacs)

| Item | Amount |
|---|---|
| Land and Building | 3.10 |
| Machinery | 3.50 |
| Miscellaneous Assets | 0.50 |
| P&P Expenses | 0.75 |
| Contingencies @ 10% on Land and Building & Plant & Machinery | 0.65 |
| Working Capital Margin | 1.17 |
| **Total** | **9.67** |
| **Means of Finance** | |
| Promoters' Contribution | 3.07 |
| Term Loan from Bank/FI | 6.60 |
| Total | 9.67 |
| Debt Equity Ratio | 2.15 : 1 |
| Promoters' Contribution | 31% |

## Conclusion

Desirability and Feasibility analysis gives a positive result and a green signal to venture into Bamboo shoots market in Delhi/NCR region.
Moreover financial assistance in the form of grant which is available from the Ministry of Food Processing Industries, Govt. of India, towards expenditure on technical civil works and plant and machinery for eligible projects subject to certain terms and conditions provides a leverage to enter into this venture.

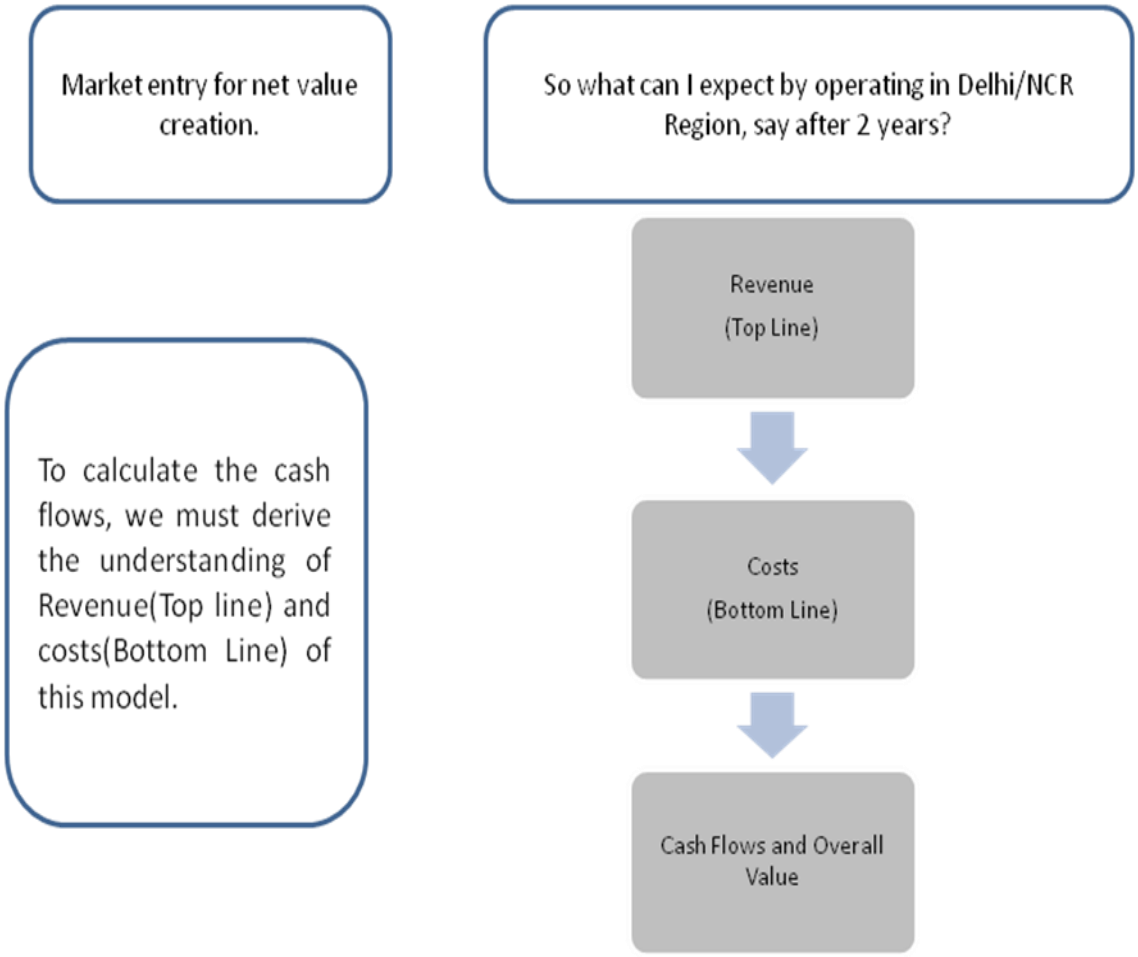



**Hence, in conjunction desirability assessment and feasibility analysis can be summarized or synthesized as an overall SWOT analysis of the business case**

Now this analysis gives ne an answer to whether there is any business sense to operate in this market, but at macro level. Now we envisage to answer " How to actually enter this market in Delhi/NCR and make profit or create value to this business move.

| **Strengths** | **Weakness** |
|---|---|
| **• Unique product on the market**<br>**• Innovation**<br>**• Diversification of product offer to consumers**<br>**• Different flavours**<br>**• Price accessible to most buyers**<br>**• Publicity strategy**<br>**• Assurance of quality and trust**<br>**• Care for health and well-being of Consumers** | • Young enterpreneur with less experience<br>• New product<br>• High caloric value<br>• Need for constant innovation<br>• High investment |
| **Opportunity** | **Threats** |
| **• Take advantage of a gap in the market of bamboo shoots incorporating new concepts** | • Limitation of the plantation maintenance and sustainability due to lack of resourceful and knowledgeable workers |

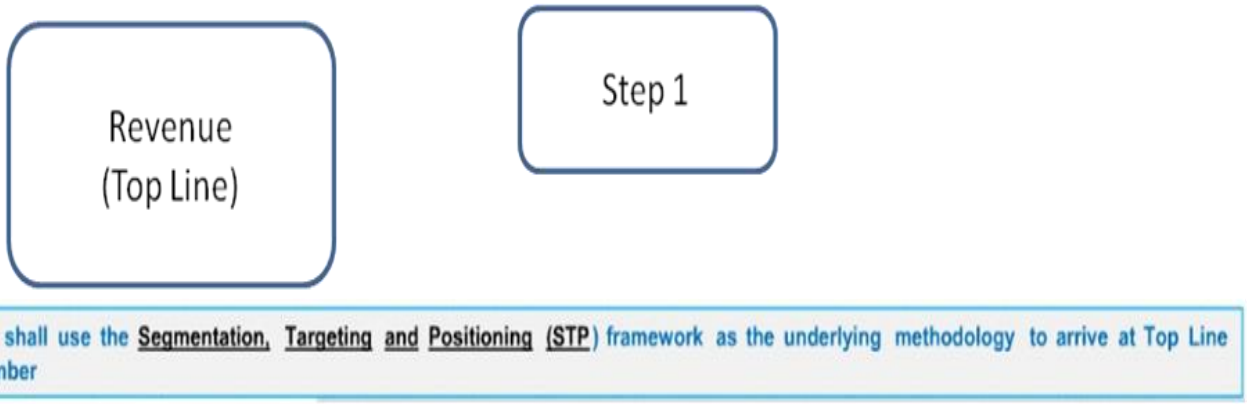
| | |
|---|---|
| **• Enter the market with a new product**<br>**• Innovate in terms of packaging**<br>**• Explore the consumers eagerness for healthier products/Create awareness**<br>**• New clients**<br>**• Habits of the Chinese cuisine prefering population regarding consumption of bamboo shoots prepared dishes**<br>**• High sales** | • Weak adhesion to the product<br>• Low growth in the market<br>• Price<br>• Financial crisis<br>• Competitors innovation |




**Market Segmentation**

For a company to reach a target market, it must have relevant information about its field of action and its business, but especially its competitors. This leads to the conduction of a market study. Making a brief market analysis one can make its product a framework for the strategic marketing where there is a mission statement that identifies the product performance space in the framework of needs and market characteristics. The main

reason for a company to perform market research is the knowledge of a market opportunity. After completing the survey the company must carefully evaluate their opportunities in that market and thus decide which markets to enter. Market research also helps to know what consumers want and how much they are willing to pay, which will confer a sustainable competitive advantage




Local traders/stores (in Kolkata, Assam, Azadpur Mundi, Kotla Mubarakpur) catering to the requirement of different communities were identified and contacted to obtain information regarding their annual sale. It was found that availability in such shops was restricted to the season. Mostly such shops stock and sell between June and December.

The breakup of consumption by end-user segment is as follows -

- Institutional 108 Tonnes
- Hotels 24 Tonnes
- Specialty Restaurants 84 Tonnes
- Households & Producers of Process Foods 24 Tonnes

The break-up of the estimates as local and of imported origin was as follows and is shown below:

- Fresh/ Local 128 Tonnes (97%)
- Imported 4 Tonnes (3%)

**Sources**: http://trade.indiamart.com/search.mp?search=bamboo+shoots
http://www.eworldtradefair.com/canned-bamboo-shoot-manufacturers-new-delhi.html
http://dir.indiamart.com/impcat/bamboo-shoots.html



**Clients Profile**

This product is aimed at all top class hotels and specialty restaurants especially Chinese food joints scattered throughout Delhi/NCR Region.

One pivotal aspect when launching a new product for commercialization is the degree of acceptance by the market and the consumers. Therefore it is important to measure the response of the target population to such product or products. So, in order to evaluate the acceptability of the product by potential consumers a market study was performed by applying questionnaires to a sizeable number of Hotels, institutions and specialty restaurants plus caterers, chosen randomly, but considered as potential future consumers.

**Excerpts from qualitative research**

| | |
|---|---|
| **Name of the firm** | **Shimla Hills Offerings Private Limited,** Shimla |
| **Annual Quantity Requirement** | **5 tonnes** |
| **Purchased from** | **Siliguri** |
| **Price** | **40 Rs/kg** |
| **Peak demand season** | **Throughout the year** |
| **Delivery service satisfaction** | **Satisfactory** |
| **Quality provided satisfaction** | **Average** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Privasia Trading,** Gurgaon |
| **Annual Quantity Requirement** | **4 tonnes** |
| **Purchased from** | **Nagaland** |
| **Price** | **45 Rs/Kg** |
| **Peak demand season** | **June-Spetember** |
| **Delivery service satisfaction** | **Average** |
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **SP Marketing,** Guwahati |
| **Annual Quantity Requirement** | **80 tonnes** |
| **Purchased from** | **Self-production** |
| **Price** | **NA** |
| **Peak demand season** | **Throughout the year but variations are there** |
| **Delivery service satisfaction** | **NA** |
| **Quality provided satisfaction** | **NA** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Cane & Bamboo Technology Centre,** Guwahati |
| **Annual Quantity Requirement** | **40 tonnes** |
| **Purchased from** | **Self-production** |
| **Price** | **NA** |
| **Peak demand season** | **Seasonal** |
| **Delivery service satisfaction** | **NA** |
| **Quality provided satisfaction** | **NA** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **S. U. Products (India) Pvt. Ltd. ,** West Punjabi Bagh |
| **Annual Quantity Requirement** | **500 kg** |
| **Purchased from** | **Ashoka Vegetable Centre** |
| **Price** | **110-120 Rs/Kg** |
| **Peak demand season** | **Jan-April** |
| **Delivery service satisfaction** | **Satisfactory** |
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Heavenly Farms,** Vasant Kunj |
| **Annual Quantity Requirement** | **200 kg** |
| **Purchased from** | **Ashoka Vegetable Centre** |
| **Price** | **110-130 Rs/Kg** |
| **Peak demand season** | **Random** |
| **Delivery service satisfaction** | **Average** |
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Fortune Institute of International Business,** Vasant Vihar |
| **Annual Quantity Requirement** | **200 kg** |
| **Purchased from** | **Ashoka Vegetable Centre** |
| **Price** | **110-120 Rs/Kg** |
| **Peak demand season** | **Throughout the year** |
| **Delivery service satisfaction** | **Average** |
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Honey Money Top(The green supermarket)** HUDA Market Gurgaon |
| **Annual Quantity Requirement** | **1 tonnes** |
| **Purchased from** | **Assam** |
| **Price** | **40-50 Rs/Kg** |
| **Peak demand season** | **Random** |
| **Delivery service satisfaction** | **Average** |
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Ashoka Vegetable Centre,** Azadpur Sabzi Mandi |
| **Annual Quantity Requirement** | **2 tonnes** |
| **Purchased from** | **Siliguri** |
| **Price** | **40-45 Rs/Kg** |
| **Peak demand season** | **Throughout the year** |
| **Delivery service satisfaction** | **Average** |
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Mint leaf(All cuisines caterers),** Saket Avenue |
| **Annual Quantity Requirement** | **700 kg** |
| **Purchased from** | **Nagaland** |
| **Price** | **45-50 Rs/Kg** |
| **Peak demand season** | **Seasonal** |
| **Delivery service satisfaction** | **Satisfactory** |

| | |
|---|---|
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Bercos** |
| **Annual Quantity Requirement** | **1 ton** |
| **Purchased from** | **Nagaland** |
| **Price** | **45-50 Rs/Kg** |
| **Peak demand season** | **Throughout the year** |
| **Delivery service satisfaction** | **Satisfactory** |
| **Quality provided satisfaction** | **Good** |
| **Additional comments** | |

| | |
|---|---|
| **Name of the firm** | **Startup Weekend India** |
| **Annual Quantity Requirement** | **NA** |
| **Purchased from** | **NA** |
| **Price** | **NA** |
| **Peak demand season** | **NA** |
| **Delivery service satisfaction** | **NA** |
| **Quality provided satisfaction** | **NA** |
| **Additional comments** | **Will provide support in presenting to venture capitalists and promoters and related guidance, if they like the concept completely** |

The sample of target customers population gives a conclusive evidence of demand for Bamboo shoots and related cuisines.The demand is expected to grow at average rate of 3-4% annually.

## Profitability Calculations

### Production Capacity & Build-up[4]

The rated capacity of the plant would be 180 tonnes per year whereas actual utilisation in the first year will be 60% and thereafter 75%.

### Sales Revenue at 80%

Considering average selling price of Rs.30/- per kg; annual sales realisation at 80% activity or 150 tonnes would be Rs.45.00 lacs.

### Raw & Packing Materials at 100%

(Rs. in lacs)

| Product | Qty. (Tonnes) | Rate (Rs./Ton) | Value |
|---|---|---|---|
| Bamboo Shoots | 180 | 5,000 | 9.00 |
| Salt | 30 | 3,000 | 0.90 |
| Tin cans, corrugated boxes, labels, etc. | @ Rs.8,000/- per Ton of finished goods | -- | 12.40 |
| | | **Total** | **22.30** |

### Utilities

Individual requirements are already explained. The annual cost at 100% utilisation shall be Rs.90, 000/-.

### Selling Expenses

There will be many expenses like discount to retailers, transportation, free sampling, publicity etc. for which a provision of 17.5% of sales value is made every year.

### Interest

Interest on term loan of Rs. 6.60 lacs is calculated @ 12% per annum assuming repayment in 4 years including a moratorium period of 1 year. Interest on working capital from bank is computed @ 14% per annum.

### Depreciation

It is calculated @ 10% on building and 20% on machinery and miscellaneous assets on WDV basis.

(Rs. in lacs)

| No. | Particulars | 1st Year | 2nd Year |
|---|---|---|---|
| **A** | **Installed Capacity** | **--- 180 Tonnes --->** | |
| | Capacity Utilisation | 60% | 75% |
| | Sales Realisation | 27.00 | 33.75 |
| **B** | **Cost of Production** | | |
| | Raw and Packing Materials | 13.40 | 16.75 |
| | Utilities | 0.54 | 0.68 |
| | Salaries | 3.00 | 3.60 |
| | Stores and Spares | 0.42 | 0.60 |
| | Repairs & Maintenance | 0.50 | 0.75 |
| | Selling Expenses @ 17.5% | 4.72 | 5.90 |
| | Administrative Expenses | 0.60 | 0.78 |
| | **Total** | **23.18** | **29.06** |
| **C** | **Profit before Interest & Depreciation** | **3.82** | **4.69** |
| | Interest on Term Loan | 0.74 | 0.53 |
| | Interest on Working Capital | 0.28 | 0.35 |
| | Depreciation | 1.05 | 0.87 |
| | Profit before Tax | 1.75 | 2.94 |
| | Income-tax @ 20% | 0.37 | 0.60 |
| | Profit after Tax | 1.38 | 2.34 |
| | Cash Accruals | 2.43 | 3.21 |
| | Repayment of Term Loan | -- | 2.05 |

**BREAK-EVEN ANALYSIS** (Rs. in lacs)

| No | Particulars | | Amount |
|---|---|---|---|
| [A] | **Sales** | | **27.00** |
| [B] | **Variable Costs** | | |
| | Raw and Packing Materials | 13.40 | |
| | Utilities (60%) | 0.32 | |
| | Salaries (70%) | 2.10 | |
| | Stores & Spares | 0.42 | |
| | Selling Expenses (70%) | 3.30 | |
| | Admn. Expenses (50%) | 0.30 | |
| | Interest on WC | 0.28 | **20.12** |
| [C] | **Contribution [A] - [B]** | | **6.88** |
| [D] | **Fixed Cost** | | **4.26** |
| [E] | **Break-Even Point [D] ÷ [C]** | | **61%** |

**Some of the equipments and packing machinery suppliers are**

1. B.Sen Berry & Co, 65/11, Rohatak Road Karol Bagh, New Delhi-110005
2. Metal Box (I) Ltd, 17, Parliament Street, New Delhi-110001
3. Cowel Can Ltd. PO Barotiwala Dist. Solan (HP).
4. Nagpal Bros. C-127 Phase II, Mayapuri Industrial Area, New Delhi-110064. Tel No. 25400407/25402631
5. Gardeners Corporation, 158, Golf Links, New Delhi-110003
6. Raylon Metal Works, PB No. 17426, JB Nagar, Andheri (E) Mumbai 400 059
7. Auric Techno Services Pvt Ltd, C-101, Shrinath Hermitage, Baner Road, Pune 411 008, Ph: 25898072, 25899113

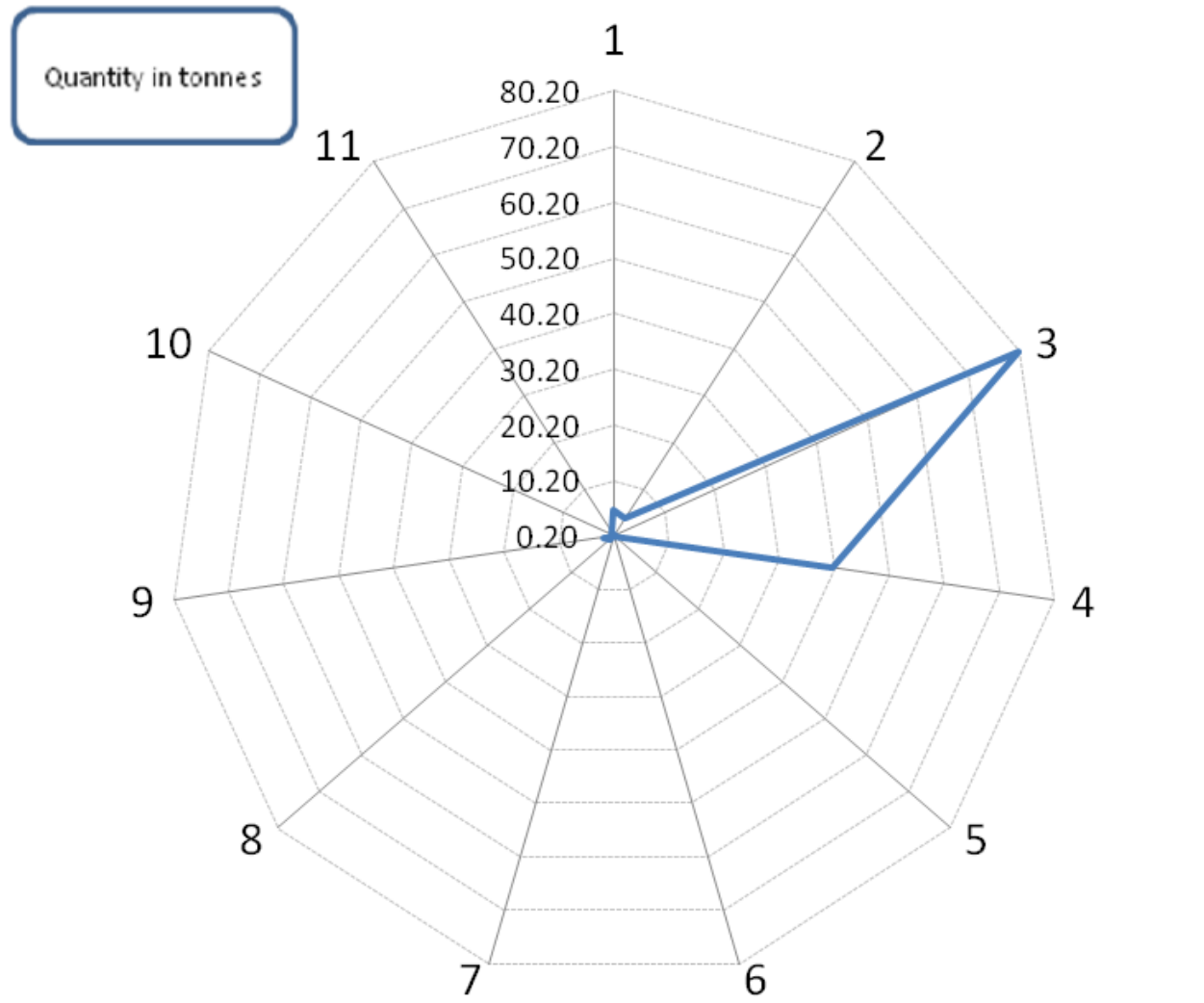
# *Chapter – XI*

# *Conclusion*

For a product to be accepted in the market it is not enough to innovate but it is also needed to go further, namely assuring that the product is well accepted by the consumer both in sensorial terms and in marketing terms.

To evidence the acceptance of the product bamboo shoot cuisines a sensory analysis was undertaken by a panel of 30 untrained tasters, and the results allowed to conclude that the product would be well accepted by consumers.

Also a market study was made to evaluate how potential buyers(Chinese cuisine outlets,specialty restaurants, caterers, high-end hotels) would react to the product, and the results of the survey allowed to confirm the acceptability of our product by the market, with a good percentage of people who buy the product.




The figure represents the annual quantity requirements of 11 sample firms under consideration to meet domestic demand. For international demand, these figures almost gets doubled.

But at initial phase taking into consideration investment needed I would prefer to go for trading to understand the dynamics of distribution practically at ground level keeping in mind the competitors and at the same time create the awareness of bamboo shoot cuisines among Chinese and novelty restaurants.
Then after a suitable period of time I will go for vertical integration i.e. operating my own bamboo plantations in Mukarian(Punjab).

**Future Scope Of Work**

This includes marketing strategies for visibility of these shoots and related cuisines as well as usage of non linear programming methods like Transportation problem to find optimized road network for transportation of harvested shoots and reducing overall logistics cost.

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## Annexure-1

## NABARD's Bamboo Development Policy

NABARD has recently formulated a Bamboo Development Policy to give real thrust to develop the sector with an integrated approach.

The major objective is to commercialise Bamboo at farmer's level. All along bamboo has been considered as a poor man's crop.It is high time we put bamboo into industrial pedestal with appropriate tie-up arrangements with bamboo based industries viz.paper,handicrafts and the new emerging areas of eco-friendly products e.g. housing,tiles, flooring,bamboo shoots etc.

The focus would be comprehensive development of bamboo resources as a marketable commodity with more emphasis on farmlands especially revenue wastelands.The planning commission approach for Agroforestry development through bamboo will be followed.A linkage of bamboo farmers with bamboo artisans will also be made. Besides, wherever feasble bamboo projects will also be promoted for development of degraded forest lands.

The above approach would broaden our interventions / business opportunities significantly as there is huge untapped potential in wasteland development under Farm forestry/ Agroforestry. Besides, inadequately managed bamboo forests and bamboos after flowering can be covered under JFM approach / co-financing etc.

Emphasis would also be made to promote quality bamboo plantation projects assisted by NABARD for higher productivity and better returns. Use of clonally propagated seedlings and Tissue cultured plants will be advocated for improving quality and productivity.

### Goals of the Policy

The major goals for bamboo development would be proper use of available bamboo resources for value addition,creation of new technology based plantations, efficient marketing, new product development through technology upgradation, institutional development/strengthening,design support leading to economic upliftment of rural people.

### Financing Models:

NABARD will promote and fund Bamboo projects under the following models:

1. Setting up of Bamboo nurseries for quality plant production including Tissue Culture plantlets

2.Wasteland development model through BAMBOO under Farm Forestry

3.Bamboo based Agroforestry model

4.Tie -up arrangement with bamboo based industries including handicrafts

5.Cluster development for Artisans and Craftpersons for bamboo product development including marketing

6. Funding under RIDF -JFM model

7. micro-Finance through NGOs under SHG model wherever feasible

**NABARD's strategy**

In order to realize maximum benefits from marketing bamboo products, NABARD will adopt the following approaches:

1) Establish supply chain from the farmer's field to large industries viz. paper,wood sustitute,plyboard, flooring,furniture etc. to improve market position. Through this arrangement , industrial farms can have easy access to bamboo raw material at competirive cost on parternership basis. NABARD will see that the business partners provide local producers with high quality planting materials,provide technical guidance, quality control and a buy- back guarantee arrangement including arranging finance wherever feasible.

2) Assist in developing small scale Forest enterprises for using Farm-forest bamboos

3) Assist the entrepreneurs in improving product quality, use of improved machines, tools and releiability for continuous and uninterrupted supply to market chain.TIFAC /IIT-Mumbai has developed effective machineries/ tools for harvesting, cross cutting,splitting, knot removing and processing of bamboos by artisans and small scale industries. NABARD will try to popularise these tools especially to the artisans.

4) Strengthen producer organizations especially the handicrafts sector for easy access to local market.The focus would be on design development, technology upgradation and market facilitation to augment the capabilities of artisans. The handicrafts sector is intimately linked to tourism sector. Hence, promotion of this sector is critical for economic growth of rural areas.

5) Imparting training to the entrepreneurs in association with INBAR, CBTC,NEDFI, etc., through workshop/ seminar to be held regularly in potential regions of the country.

6) Remove regularity barriers especially for free movement of bamboo produced from farmer's fields.

**Review of Private Plantation Companies & Follow up action by SEBI:**

Recently private investments are forthcoming from companies raising plantations with or without involving public equity. As such this is a welcome effort to meet the objectives laid down in *National Forest Policy*. However, the promises made by such companies are apprehended to be unrealistic. Hence, it is essential to look into the claims made by these companies to prevent exploitation of investors as well as to provide adequate safeguards that the investment raised are properly utilised and the confidence of investors in afforestation activities does not get a jolt.

Therefore, *Ministry of Environment and Forests* constituted an inter departmental committee to study the growth rate and Economics of private plantation companies and to ascertain the truth behind their claims.

On the basis of the detailed analysis of the data collected, technical information available, and observations, the committee made strong recommendations. Based on these, *SEBI* has cautioned the investors through a public notice which may be followed.