Bamboo as a Money-making Industry

Cultivation, Manufacturing and Utilization

(Bamboo Products, Bamboo Used For Paper Manufacture, Bamboo Pulp, Pulp and Paper Manufacture)

Introduction

Bamboo is one of the most abundant and environmental-friendly and sustainable resources available in NE Region, which is not being used to its full potential. Bamboos, which are widespread in India, offer numerous opportunities in this regard, and there is much potential for expanding it. In view of commercial cultivation and economic utilization of bamboo as a substitute for the fast depleting timber resources, a comprehensive programme of bamboo for sectional up gradation, enhancement of employment opportunities for artisans, promotion of value-addition through better and well-designed product development, optimum propagation and conservation and diversifying production and processing activities through organized community action has been taken up.

A bamboo farm once started could continue to exist for years on and give you some form of residual income. Bamboo starter plants, meanwhile, are sold from $25 to more than $100. To make sure the bamboo variety you've chosen is suited to your place's climate and soil, grow it on a small scale first. Planting bamboos should follow recommended specifications, particularly with regards to spacing.

Bamboo is a versatile, strong, renewable and environment-friendly material. Bamboo has a lot of economic benefits and that is why it is a brisk business to start a bamboo farms. Because of its strength and resilience, bamboos are utilized as a building material (scaffolding, roofing, flooring et al) in the construction industry,

it can be used to make furniture, it is used for decorations, bamboos are used as writing surface, bamboo fiber are used to make high quality paper, bamboo are used to produce musical instruments and it is also used to construct weapons.

Bamboo and Global Challenges

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.

- 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.
- 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.

Stating that there is a tremendous demand of bamboo in domestic and global market, "Therefore, there is an immediate requirement to increase production of quality bamboo to meet the enhancing demand in other section of the society apart from elevating bamboo-related traditional industry as well as bamboo enterprises."

There is an urgent requirement to make an expeditious development of bamboo sector in India which is impossible without formulating appropriate strategies. The market for bamboo and bamboo products is growing and over the past years has been spearheaded by a rapid increase in bamboo production.

From the year 2010 to 2015, the growth in the bamboo industry should be starting to acquire a definite contour. While the focus in the foundation years was on the industries that were already using bamboo as a raw material – the paper industry and handicrafts – and setting up the infrastructure and investment in new industries, the emphasis in this stage will be on the shift from lower value-added applications to higher value-added ones – bamboo board, flooring and bamboo shoot for example.

Bamboo is an important non wood forest product. In India, bamboo, which is traditionally considered the Poor man wood, and labelled as Green Gold is being considered a major export item by the centre for the global market. Bamboo is perfectly suited to agro forestry as a woody grass. Bamboo has been exploited from natural stands from time immemorial. Bamboo is increasingly being cultivated like other agricultural crops, that is, in professionally managed plantations. The growth of industries utilizing bamboo requires the sustainable cultivation and management of bamboo resources. India is blessed with very rich bamboo resources.

India is blessed with very rich bamboo resources. Bamboo can play an important role in raising forest cover and a major role in stabilization of the environmental problems. The annual yield in tonnes/ha depends on the environment as well as the species. It is estimated that almost 25% of the biomass in the tropics and 20% in the subtropics, come from bamboo. 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. Bamboo is one of many sustainable non wood resources that can generate income for a large forest dependent rural population and it needs to take further steps to realize its full potential.

In India, the North East has the largest stock and diversity of bamboos. Though India has the largest area under bamboo, the yield per hectare is very low compared to other countries. Bamboo plantation rising should be encouraged & promoted due to their high value, productivity, uniformity of crop, choice of species linked to peoples' need and industrial need. Bamboo forest constitutes about 13% of the total forest area of the country. About 50% of bamboo produced in India grows in North Eastern region and West Bengal. India has the second largest bamboo reserves in the world after China.

This book basically deals with bamboos in India, the bamboo plant harvesting, cultivating, silviculture and management, collection of material and preparation of cuttings treatment for root induction in cuttings, preparation of nursery and planting nursery management transplanting,

pattern of biomass allocation in growing bambusa bamboos, biochemical characteristics of plantation bamboo leaf (bambusa bambos) with reference to organic productivity, economic analysis, bamboo plantation, problems and prospects, need for bamboo plantation, consumption pattern of bamboos in India, working and finishing qualities of bamboo, bamboos for structural use, pipe water supply system and drainage, bamboo furniture weaving industry etc.

This book provides a complete detail on Bamboo plantation and its utilization. This book contains chapters like types of bamboo in India, taxonomy, cultivation, harvesting, growth management, bamboo utilization, Bamboo products and many more. This book will be very helpful to all its readers, environmentalists, agronomists, entrepreneurs, industrialists, or anyone with a special interest in bamboo cultivation.

Table of Contents

Thailand
Vietnam
Africa
America

3. BAMBOOS IN INDIA

Arundinaria Michaux s.s.
Bambusa Schreber
The Chinese Bamboo
Chimonobambusa Makino
Dendrocalamus Nees
Dinochloa Buse
Drepanostachyum Keng
Gigantochloa Kurz
Himalayacalamus Keng
Indocalamus Nakai
Melocanna Trin.
Ochlandra Thw.
Oxytenanthera Munro

Phyllostachys Sieb. and Zucc.
Pleioblastus Nakai
Pseudosasa Nakai
Pseudoxyenanthera Soderstrom and Ellis
Schizostachyum Nees
Semiarundinaria Makino
Sinarundinaria Nakai
Sinobambusa Makino
Thamnocalamus Munro
Thyrsostachys Gamble

4. THE ENVIRONMENT

The Bamboo Plant
Culm
Rhizome
Flower
Flowering

5. CULTIVATION

Soil
Preparation for Plantations
Fertilizers
Regeneration
Propagation
Silviculture and Management

6. HARVESTING

Yield
Production

7. TAXONOMY

8. ECOLOGICAL REQUIREMENTS

9. GROWTH CHARACTERISTICS

Development of Bud
Clump and Culms
Rhizomes
Flowering
In Vitro Flowering of Bamboo

10. ESTABLISHMENT AND MANAGEMENT

Direct Sowing of Seeds
Seed Characters
Direct Sowing
Transplanting
By Culm With Roots and Rhizome
By Stock With Roots and Rhizome
By Rhizome With Roots
By Offset Planting
By Culm Cutting
Collection of Material and Preparation of Cuttings
Treatment for Root Induction in Cuttings

Preparation of Nursery and Planting
Nursery Management
Transplanting
Precautions
By Branch Cuttings
By Tissue Culture and Macroproliferation
Tissue Culture of Bamboo
Collection of the Bud Materials
Sterilisation of Explants
Preparation of Media
Sub Culture
Rooting and Outplanting
Transplanting
Production of Culms
Macroproliferation
Season of Planting
Number Under Planting
Method of Planting
Guidelines for Management

11. GROWTH AND DEVELOPMENT

Growth of Seedlings
Development of Rhizome
Culm Growth and Development
Annual Recruitment of Culms
Culm Height and Diameter
Monthly Recruitment of Culm
Daily Height Growth
Pattern of Biomass Allocation in Growing Bambusa Bambos

12. BIOMASS AND YIELD

Biomass Production
Total Biomass
Below Ground and Above Ground Ratio
Biochemical Characteristics of Plantation Bamboo Leaf (Bambusa Bambos)
With Reference to Organic Productivity
Economic Analysis
Bambusa Bambos

Dendrocalamus Strictus
Expenditure
Income

13. CYCLE AND FERTILIZER APPLICATION
Felling Cycle
Fertilizer Application
Three Elements (Nitrogen, Phosphorus and Potassium)
Amount of the Three Elements to be Applied
Effect of the Various Kind of Nitrogen Fertilizers
Other Elements (Silicate)
Season of Fertilizer Application

14. INTRODUCTION IN SOCIAL FORESTRY
Strip Plantation
Community Forestry/Programme
Degree of Local Participation
Local Institutions
Land Allocation

Procedure of Working
Requirements/Rule of Working
Resource Sharing
Monitoring of Works
Limitations
The Problem of Land Use Conflicts
Lack of Identity of Interests
Scope for Community Forestry
Agroforestry Plantation
Bamboo with Horticulture Crops
Rehabilitation of Degraded Forest
Afforestation
Reclamation of Wastelands

15. NEED FOR BAMBOO PLANTATION

Present State of Pulp and Paper Industries
Raw Material
Raw Material Status

Guidelines for Raising Bamboo Plantation
Preparation of Nursery and Planting
Transplantation
Production of Culms
Research Work on Selecting Bamboo Species for Paper-making
Comparison of Pulp and Paper Making Characteristics of Plantation Bamboo with some Tree Species
Establishment of a Bamboo Plantation by Paper Industry Bamboo

16. BAMBOO PLANTATION-PROBLEMS AND PROSPECTS

Cultivation Techniques
Projection of Culms
Problems of Cultivation
Seed Collection
Vegetative Propagation
Soil Moisture Conservation
Plant Protection
Weeds
Grazing and Fire

Clump Congestion
Socio-economic Constraints
Prospects of Bamboo Cultivation
Economic Analysis
Employment Generation

17. UTILIZATION

Consumption Pattern of Bamboos in India
Other Recent Uses
Bamboo Parquet (Block Flooring)
Laminated Bamboo
Bamboo Strip for Air Craft
Bamboo - Reinforced Concrete
Artificially - Shaped Bamboo
Bamboo, New Raw Material for Phytoserol

18. MASS PROPAGATION

Materials and Methods
Results and Discussions

19. NON-LINEAR MODELS IN BAMBOO SEEDLINGS

Materials and Methods
Results and Discussion
Conclusion

20. PROPERTIES AND PRESERVATION

Natural Durability of Bamboo
Preservative Treatment of Harvested Bamboos
Prophylactic Treatment of Bamboos during Storage
Drying or Curing and Seasoning

21. BAMBOO AND ITS USES

Bamboo Shoots
Seeds
Leaves
Fruits
Rhizomes
Banslochan, Tabashir or Tabasheer
Culms
Working and Finishing Qualities of Bamboo

Bamboos for Structural Use
Pipe Water Supply System and Drainage
Bamboo Furniture
Weaving Industry
Bamboo Board
Bamboo Reinforcement in Concrete
Bamboo-reinforced Mud Walls
Light Bamboo Wall
Paper Pulp
Rayon Pulp
Bamboo as Fuel
Bamboo as Charcoal
Conservation of Soil
Bamboo as a Saviour of Environment
Phytoremediation of Polluted Environment
A Renewable Resource for Agro-forestry Production
Bamboos as Ornament
Artificially Shaped Bamboo
Bamboo for Alleviation of Poverty
Women Empowerment
Potential in India

22. BAMBOO CUISINE

Sungsi
Sayur Rebung
Garang Asam
Gulai Manis Rebung
Gulai Rebung Masam
Gulai Rebung Teri Basah
Beko

23. GROWTH YIELD AND ECONOMICS

Productivity
Demand and Supply Position
Market
Price-Trend
Employment Generation
Economic Analysis
Resource Survey
Trade
Socio-economics

24. BAMBOO PRODUCTS

Strength Properties and Other Parameters
Characteristic Uses
Seasoning of Bamboo
Seasoning Behaviour of Round Bamboo
Air Seasoning
Kiln Seasoning
Chemical Seasoning
Shrinkage Behaviour of Round Bamboo
Inter Section Point (I.S.P.)
Electrical Resistance of Bamboo
Preservation of Bamboo
Preservative Treatment of Bamboos
Methods of Treatment of Bamboos
Treatment of Dry Bamboos
Treatment of Green Bamboos
Performance of Treated Bamboos
Specialised Technological Uses of Bamboo
Building Boards from Bamboo

Properties of the Boards
Packaging Purpose Boxes
Structural Applications of Bamboo
Technology of Bamboo constructions and Erection Aspects
Erection of Truss

25. CHEMICAL ANALYSIS OF BAMBOO TISSUES
Experimental

26. OPTIMUM DIGESTION CONDITIONS FOR PRODUCTION OF STRONG BAMBOO PULPS -A PRELIMINARY STUDY
Experimental Procedure
Results
Conclusion

27. ANATOMICAL FEATURES OF BAMBOO USED FOR PAPER MANUFACTURE
Growth of Bamboo Culm
Structural Topography of Internode

28. STUDIES ON COLOUR REVERSION OF BAMBOO PULP BLEACHED WITH C-E-H SEQUENCE

Introduction
Literature Review
Experimental
Set 1- Effect of Delignification
Set 2 - Effect of Over and Underchlorination
Set 3 - Effect of Alkali Charge in Alkali Extraction
Set 4 - Effect of Temperature in Alkali Extraction
Set 5 - Effect of Hypochlorite Charge in Hypo Stage
Set 6- Effect of pH (Buffer) in Hypo Stage
Set 7 - Effect of Temperature in Hypo Stage
Observations and Discussion
Conclusion

29. EFFECT OF BEATING ON THE CELL MECHANICS OF THE INDIVIDUAL BAMBOO FIBRE

Elementary Fibril
Cell Wall Mechanics of Wood Fibres

Cell Wall Structure
Force Distribution Across the Cell Wall
Internal Fibrillation
External Fibrillation
Bamboo Fibres

30. STUDIES ON THE FINES OF BAMBOO PULP

Experimental
Fractionation of Pulp
Isolation of Fines
Chemical Composition of Fines & Coarse Fractions
Evaluation of Whole Pulp and Fractionated Pulp in Valley Beater
Evaluation of Recombined Pulps
Discussion of Results
Fractionation of Pulp
Chemical Composition of Fines and Coarse Fibre Fractions
Influence of Fines on Some Pulp and Sheet Properties
Properties of Recombined Pulps
Conclusions

31. PULP AND PAPER MANUFACTURE

Chemistry and Morphology
Hemicelluloses
Fibre Morphology
Proximate Chemical Composition
Chemical Pulping
First Stage Digestion
Bleaching of Chemical Pulps
High Yield Pulping
Bleaching of High Yield Pulps
Rayon Grade Pulp
Fibre Morphology and Sheet Properties
Beating Characteristics
Decay on Storage and Its Effect on Pulp Properties
Industrial Experiences on Paper Making From Bamboo

32. PESTS OF BAMBOO

Seed Pests
Control

Nursery Pests
Termites
Control Measures
Plantation and Natural Stands of Bamboos
Culm and Shoot Borers
Defoliators
Witches Broom
Sap Suckers
Felled and Stored Bamboos
Termites
Protection Strategies
Protection of Bamboo Seeds
Nursery Pests
Plantations and Natural Stands
(a) Defoliators
(b) Sap Suckers
(c) Culm and Shoot Borers
Felled and Dried Bamboos

33. DISEASES AND DECAY OF BAMBOO

Microflora of Stored Bamboo Seeds
Nursery Diseases
Damping-off
Foliage Diseases
Witches' Broom
Diseases of Bamboo in Plantations and Natural Forests
Bamboo Blight
Rhizome Bud Rot
Rhizome Rot
Basal Culm Rot
Culm Rot
Culm Sheath Rot
Rhizome and Root Rot
Stem Infection
Foliage Infection
Decay in Bamboo

34. ASSOCIATIONS AND INSTITUTIONS

The Forest Research Institute, Dehra Dun
The State Forest Research Institutes (SFRIs)
Support to Craft and Artisan Related Activities: Training, Extension and Marketing
Industry and Related Applications
Integrated Rural Bamboo (IRB) Project
Bamboo Information Centre (BIC-India)
American Bamboo Society
The Bamboo Society of Austrialia
European Bamboo Society
The International Bamboo Foundation & The Environmental Bamboo Foundation of Indonesia, Indonesia
International Bamboo Association (IBA) and the
International Network for Bamboo and Rattan (INBAR)

Niir Project Consultancy Services (NPCS)

can provide Process Technology Book on Bamboo Plantation and Utilization

See more

http://goo.gl/VsU5WM
http://goo.gl/7Pte87
http://goo.gl/uJWqdl

Visit us at

www.entrepreneurindia.co

Take a look at NIIR PROJECT CONSULTANCY SERVICES on #StreetView

https://goo.gl/VstWkd

Locate us on

Google Maps

https://goo.gl/maps/BKkUtq9gevT2

Contact us

Niir Project Consultancy Services

106-E, Kamla Nagar, Opp. Spark Mall,

New Delhi-110007, India.

Email: npcs.ei@gmail.com , info@entrepreneurindia.co

Tel: +91-11-23843955, 23845654, 23845886, 8800733955

Mobile: +91-9811043595

Fax: +91-11-23841561

Website :

www.niir.org

www.entrepreneurindia.co

Take a look at NIIR PROJECT CONSULTANCY SERVICES on #StreetView

https://goo.gl/VstWkd

NIIR PROJECT CONSULTANCY SERVICES

An ISO 9001:2008 Company

www.entrepreneurindia.co

npcs

Who are we?

- *One of the leading reliable names in industrial world for providing the most comprehensive technical consulting services*
- *We adopt a systematic approach to provide the strong fundamental support needed for the effective delivery of services to our Clients' in India & abroad*

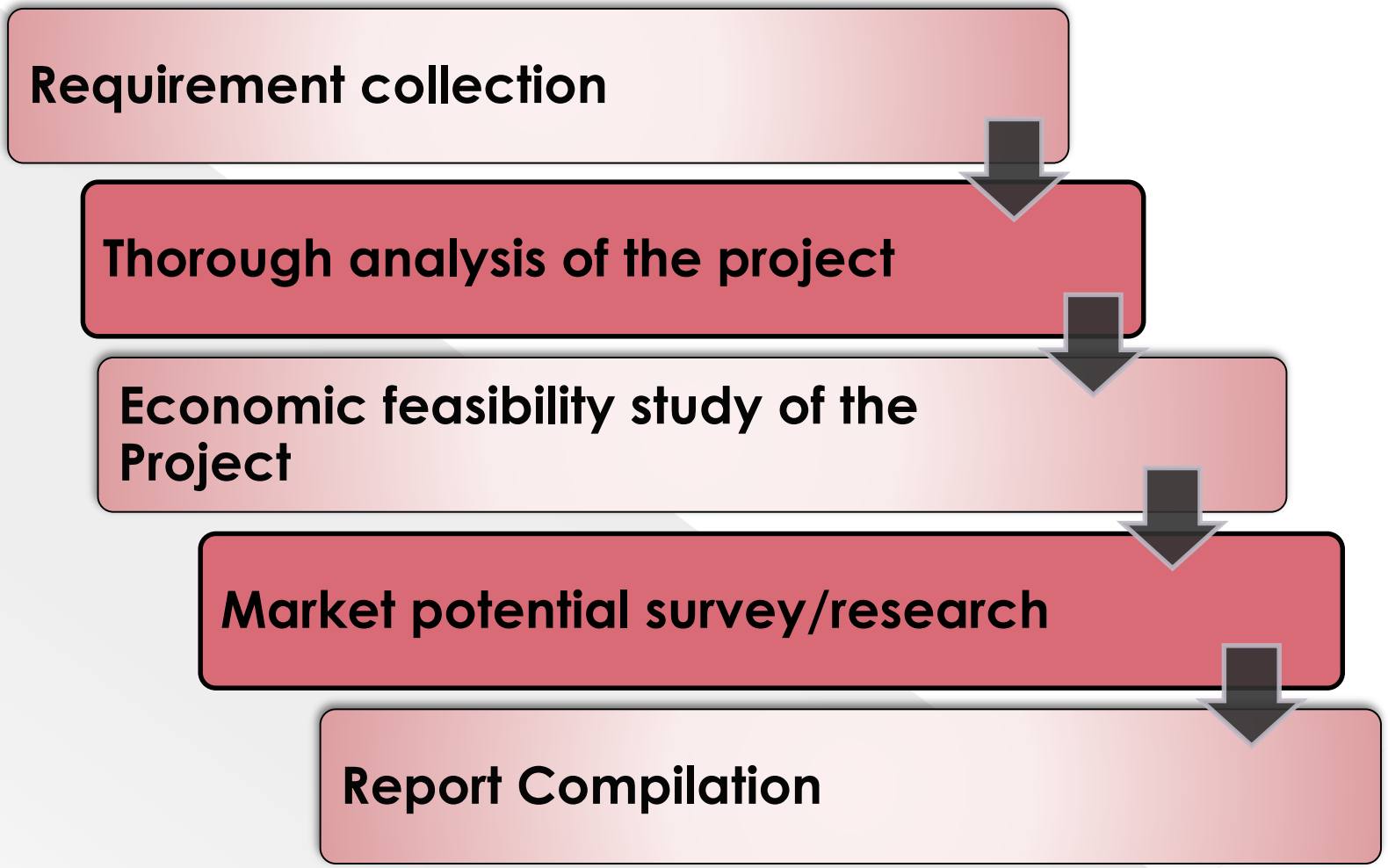
What do we offer?

- *Project Identification*
- *Detailed Project Reports/Pre-feasibility Reports*
- *Business Plan*
- *Industry Trends*
- *Market Research Reports*
- *Technology Books and Directory*
- *Databases on CD-ROM*
- *Laboratory Testing Services*
- *Turnkey Project Consultancy/Solutions*
- *Entrepreneur India (An Industrial Monthly Journal)*

How are we different ?

- *We have two decades long experience in project consultancy and market research field*
- *We empower our customers with the prerequisite know-how to take sound business decisions*
- *We help catalyze business growth by providing distinctive and profound market analysis*
- *We serve a wide array of customers , from individual entrepreneurs to Corporations and Foreign Investors*
- *We use authentic & reliable sources to ensure business precision*

Our Approach



Who do we serve?

- *Public-sector Companies*
- *Corporates*
- *Government Undertakings*
- *Individual Entrepreneurs*
- *NRI's*
- *Foreign Investors*
- *Non-profit Organizations, NBFC's*
- *Educational Institutions*
- *Embassies & Consulates*
- *Consultancies*
- *Industry / trade associations*

Sectors We Cover

- *Ayurvedic And Herbal Medicines, Herbal Cosmetics*
- *Alcoholic And Non Alcoholic Beverages, Drinks*
- *Adhesives, Industrial Adhesive, Sealants, Glues, Gum & Resin*
- *Activated Carbon & Activated Charcoal*
- *Aluminium And Aluminium Extrusion Profiles & Sections,*
- *Bio-fertilizers And Biotechnology*
- *Breakfast Snacks And Cereal Food*
- *Bicycle Tyres & Tubes, Bicycle Parts, Bicycle Assembling*

Sectors We Cover Cont...

- *Bamboo And Cane Based Projects*
- *Building Materials And Construction Projects*
- *Biodegradable & Bioplastic Based Projects*
- *Chemicals (Organic And Inorganic)*
- *Confectionery, Bakery/Baking And Other Food*
- *Cereal Processing*
- *Coconut And Coconut Based Products*
- *Cold Storage For Fruits & Vegetables*
- *Coal & Coal Byproduct*

Sectors We Cover *Cont...*

- *Copper & Copper Based Projects*
- *Dairy/Milk Processing*
- *Disinfectants, Pesticides, Insecticides, Mosquito Repellents,*
- *Electrical, Electronic And Computer based Projects*
- *Essential Oils, Oils & Fats And Allied*
- *Engineering Goods*
- *Fibre Glass & Float Glass*
- *Fast Moving Consumer Goods*
- *Food, Bakery, Agro Processing*

Sectors We Cover Cont...

- *Fruits & Vegetables Processing*
- *Ferro Alloys Based Projects*
- *Fertilizers & Biofertilizers*
- *Ginger & Ginger Based Projects*
- *Herbs And Medicinal Cultivation And Jatropha (Biofuel)*
- *Hotel & Hospitability Projects*
- *Hospital Based Projects*
- *Herbal Based Projects*
- *Inks, Stationery And Export Industries*

Sectors We Cover *Cont...*

- *Infrastructure Projects*
- *Jute & Jute Based Products*
- *Leather And Leather Based Projects*
- *Leisure & Entertainment Based Projects*
- *Livestock Farming Of Birds & Animals*
- *Minerals And Minerals*
- *Maize Processing(Wet Milling) & Maize Based Projects*
- *Medical Plastics, Disposables Plastic Syringe, Blood Bags*
- *Organic Farming, Neem Products Etc.*

Sectors We Cover *Cont...*

- *Paints, Pigments, Varnish & Lacquer*
- *Paper And Paper Board, Paper Recycling Projects*
- *Printing Inks*
- *Packaging Based Projects*
- *Perfumes, Cosmetics And Flavours*
- *Power Generation Based Projects & Renewable Energy Based Projects*
- *Pharmaceuticals And Drugs*
- *Plantations, Farming And Cultivations*
- *Plastic Film, Plastic Waste And Plastic Compounds*
- *Plastic, PVC, PET, HDPE, LDPE Etc.*

Sectors We Cover Cont...

- *Potato And Potato Based Projects*
- *Printing And Packaging*
- *Real Estate, Leisure And Hospitality*
- *Rubber And Rubber Products*
- *Soaps And Detergents*
- *Stationary Products*
- *Spices And Snacks Food*
- *Steel & Steel Products*
- *Textile Auxiliary And Chemicals*

Sectors We Cover *Cont...*

- *Township & Residential Complex*
- *Textiles And Readymade Garments*
- *Waste Management & Recycling*
- *Wood & Wood Products*
- *Water Industry(Packaged Drinking Water & Mineral Water)*
- *Wire & Cable*

Contact us

Niir Project Consultancy Services

106-E, Kamla Nagar, Opp. Spark Mall,

New Delhi-110007, India.

Email: npcs.ei@gmail.com , info@entrepreneurindia.co

Tel: +91-11-23843955, 23845654, 23845886, 8800733955

Mobile: +91-9811043595

Fax: +91-11-23841561

Website :

www.niir.org

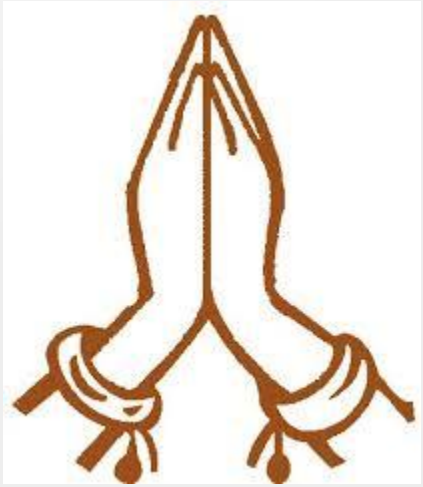
www.entrepreneurindia.co

Take a look at NIIR PROJECT CONSULTANCY SERVICES on #StreetView

https://goo.gl/VstWkd

Follow Us

- https://www.linkedin.com/company/niir-project-consultancy-services
- https://www.facebook.com/NIIR.ORG
- https://www.youtube.com/user/NIIRproject
- https://plus.google.com/+EntrepreneurIndiaNewDelhi
- https://twitter.com/npcs_in
- https://www.pinterest.com/npcsindia/



THANK YOU!!!

For more information, visit us at:

www.entrepreneurindia.co