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**CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE
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**Technology Transfer Aspects of Business Development
and
Technologies Developed Based On Coconut**

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(AN ISO – 9001:2000, ISO-14001 ORGANIZATION & NABL ACCREDITED LABORATORY)

- **Technology:** The “systematic knowledge for product manufacture and service provision in Industry, farming and commercial fields” and knowledge is reflected in inventions, utilities models, and designs data forms.
- **Technology Transfer:** Technology transfer is the process by which basic science research and fundamental discoveries are developed into practical and commercial relevant applications and products. The processes by which existing knowledge, facilities and capabilities are utilized to fulfill the public and private needs. Identify dedicated research which has great potential for commercialization and how to explore it.
- **Technology Transfer process:** It has stages, phase and typical behaviours. It operates and can be understood at different levels (Technology Policy, Individual Scientist). It involves different stake holders, (developers, investors, users).

- **What is Business Intelligence?** Business Intelligence (BI) aims at making better business decisions through the use of a broad category of **Management Information Systems, applications and technologies for gathering, storing, analyzing, and providing access to data.** BI uses timely and accurate information to make decisions.
- **Entrepreneurship:** An entrepreneur is a person of very **high aptitude who pioneers change, possessing characteristics found in only a very small fraction of the population.** On the other extreme of definitions, anyone who wants to work for himself or herself is considered to be an entrepreneur.
- **Marketing:** is defined by the **as the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large.**
- **Food safety:** *Food safety* refers to the conditions and practices that preserve the quality of *food* to prevent contamination and food borne illnesses.

TECHNOLOGY TRANSFER INTERSECTION BETWEEN

SCIENCE

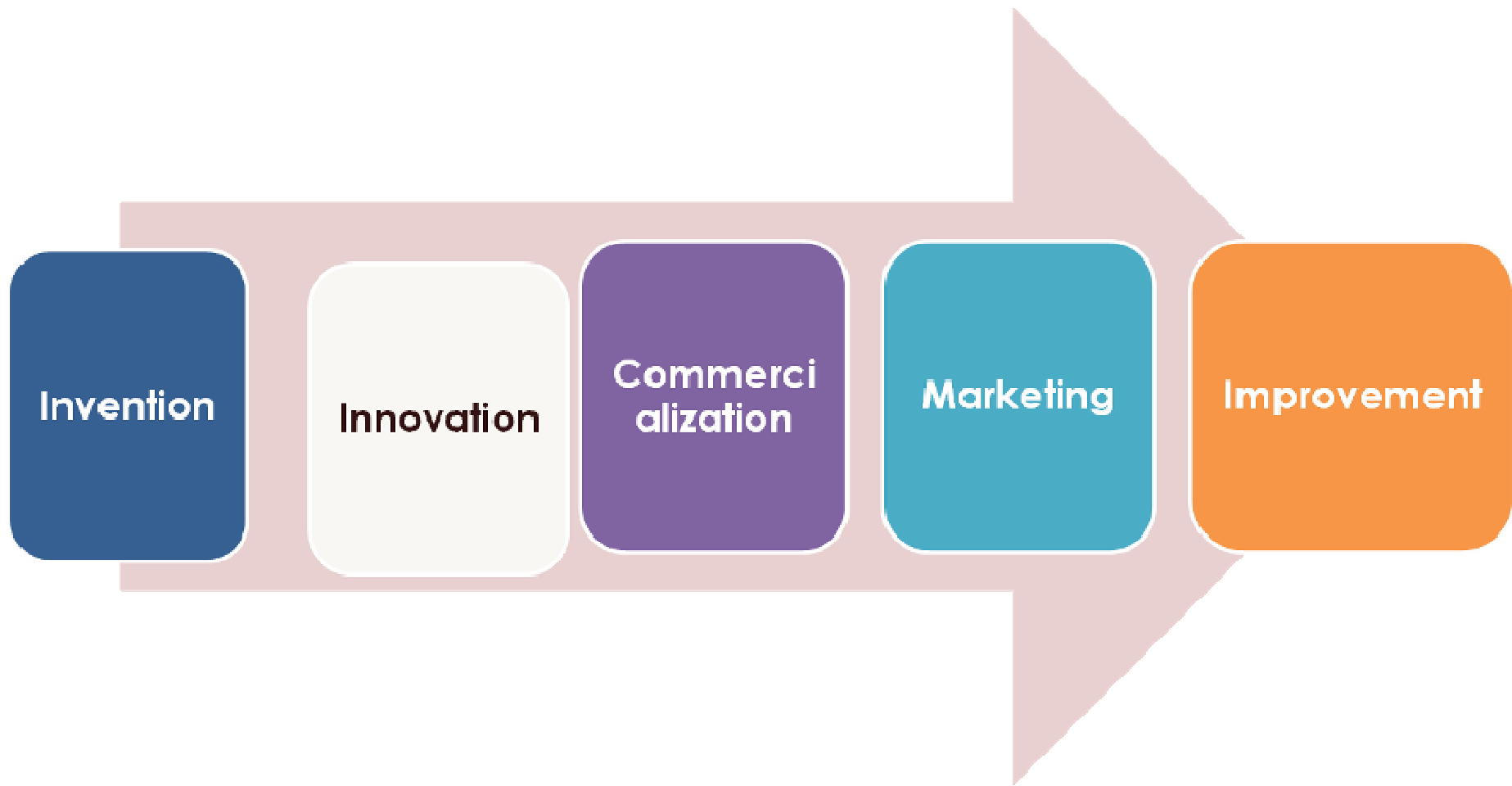
ENGINEERING

BUSINESS

LAW

GOVERNMENT

LIFE CYCLE OF TECHNOLOGY



TECHNOLOGY CANVAS

- **Basic Technologies**
 - Low impact, but must have; “Past” technologies
- **Key Technologies**
 - High-impact & Differentiating; “Current” technologies
- **Emerging Technologies**
 - Potential high impact; “Immediate” future
- **Future Technologies**
 - Inadequate clarity; Promising? “Tomorrow’s” future

TWO DIMENSIONAL CHARACTERISTICS OF PRODUCTS



Increased technical newness

Increases Market Requirement
↓

Product Objectives	No. Technological Changes	Improved Technology	New Technology
No Market Change	New Market	Reformulation	Replacement
Strengthened Market	Remerchandising	Improved Product	Product Line Extension
New Market	New Use	Market Extension	Diversification

CLASSIFICATION OF NEW PRODUCTS

- **‘Me-too products’**: The product is basically same as an existing one, but **produced by another company**. This category of new products represents the largest group of new food products.
- **Line extensions**: These are **new variants of a well - known product**. Typical examples are new flavours for existing products or new tastes in a family of products. The design process of these products can be characterized by relatively little effort and development time, small changes in the manufacturing process, little change in marketing strategy and a minor impact on storage and/or handling techniques
- **Repositioned existing products**: Current products that are again promoted in order to **reposition them**. For example, owing to increased onus being placed on health benefits, a company repositioned its energy food line as being amylase rich. The development time for these kind of repositioned products can be minimal and only the marketing department need to put in efforts in order to capitalize on the emerging niche market in this respect.

- **New form of existing products:** The **existing products that are altered to another form** (e.g. solved, granulated, concentrated, made spreadable, dried or frozen). For example, instant dried soups. These products may require an extensive development time because the physical properties of the product are changed drastically.
- **Reformulation of existing products:** It means the known **products redesigned with a new formula**. This may be due to the reduction in the costs of ingredients, irregular supply of certain raw materials, or the availability of new ingredients with improved characteristics. Examples are products with better colour, improved flavour, more fibres, less fat, etc. The design process for these products is usually inexpensive and needs a relatively short development time. However, for food products even minor changes in composition might have profoundly great consequences in terms of physiochemical and microbiological stability.
- **New packaging of existing products:** This involves refashioning accepted products with **new packaging concepts**. For example, the technique of modified atmosphere packaging has created many opportunities to extend the shelf life of various food products. With respect to the design process, products may need to be reformulated for the new application (e.g., microwave packaging). New packaging concepts may, however require expensive packaging equipment.

- **Innovative products:** These are defined as products resulting from changes in an existing product aside from what has been described above. The incorporated changes **must have an added value**. The design process is generally longer and more expensive when more product changes are required. Marketing can also be costly because consumers may have to be educated about its inherent to the novelty. However, in some cases time and costs of innovation are relatively little, e.g., successfully innovating ready-to-cook product based on assembling frozen vegetables and a frozen pastry on a tray.
- **Creative products; also called true new products:** they constitute **entirely new products** hitherto not known in the market. Typical examples are novel protein foods (or meat replacers) that are produced from vegetable proteins. Creative products commonly require extensive product development, they tend to be costly need much marketing effort, new equipments etc., and have a high failure chance.

(Anon, 1999; Fuller, 1994; Luning et al., 2002)

HOW?

- **Technology-push**

- Changes in scientific and engineering knowledge make -

- new products or processes feasible, or
- cost of existing products to come down

- **Demand-pull**

- Market for an innovation expands, causing benefits realizable through product- or process-innovation to exceed costs

SEGMENTED VIEW OF COMMERCIALIZATION

- **IMAGINING**

- The linking of a technological discovery to a worthwhile and exciting market opportunity

- **INCUBATING**

- Defining the technology sufficiently to understand its true potential, whether it will be cost-effective enough (commercializability)

- **DEMONSTRATING**

- Taking technology up to a point where it gets recognized as commercializable
- Embedding technology in marketable products or processes (product development)
- Mobilizing the market constituents needed for gaining market acceptance and delivering the benefits of technology

- **PROMOTING**

- Marketing the final products and processes to an often skeptical customer/user group (Market development)
- Choosing an appropriate business formula for gaining access to the required business system

- **SUSTAINING**

- Realizing value from the technology after it has been launched.

KNOW YOUR COMPETITORS

It is very important in business to know one's competitors and their strategies to remain competitive and there is a simple framework to understand them:

The competitor as a food processor

- What is his experience in the business?
- What are his resource:
 - (i) size of operation,
 - (ii) technology,
 - (iii) financial resources and
 - (iv) market credibility.

The competitor's clients

- Does he have many clients?
- Who are thy?
- Are his clients happy?
- Can he retain customers?

The competitor's product

- Is his product better?
- How is his product different?

The competitor's price

- Is his price cheaper? Why?

The competitor's promotional strategies

- Does he provide better credit/ discounts?

The competitor's place

- Does he directly deal with consumers?
- Does he have agents/ distributors?

IDENTIFY YOUR COMPETITION

- **By market research data**
- **By demand for product**
- **By your nearest direct and indirect competitors**
- **By the strengths and weaknesses of competitors**
- **By an assessment of how competitors businesses are doing**
- **By a description of the unique features of your product**
- **By the similarities and dissimilarities between your product and competitor's**
- **By a pricing strategy for and comparison of yours and the competition's**

NEGOTIATION

- **Coordinate – Cross bridging**
- **Nurture – Feed them**
- **Link – Don't Forget**

TECHNOLOGY DEVELOPMENT

- ❖ **Radical Development**
- ❖ **Societal Development**
- ❖ **Incremental Development**



INNOVATIONS

- ❖ **Process Innovation** (reduction of cooking time, increase the shelf life)
- ❖ **Ingredients Innovation** (Butter buds – Fat replacer)
- ❖ **Product Innovation** (Designed Foods)



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TYPES OF TECHNOLOGIES

- ❖ **Raw Technology: Technology to be worked out or under processing**
- ❖ **Semi Cooked Technology: Technology required to scale up or some improvement is required**
- ❖ **Cooked Technology: Fully matured technology**

REASONS OF INDUSTRY FAILURE

- ⊗ **Lack of well thought and market planning**
- ⊗ **Introduction of product before adequately testing**
- ⊗ **Inaccurate appraisal of the need for a product**
- ⊗ **Insufficient product research**
- ⊗ **Lack of presetting of the package**
- ⊗ **Higher cost than anticipated**
- ⊗ **Inadequate sales and price**
- ⊗ **Product timing**
- ⊗ **Weakness in distribution**

FOR SUCCESSFUL INDUSTRY

- **Area survey**
- **Literature survey**
- **Market survey**
- **Product development**
- **Market forecasting**
- **Raw material forecasting**
- **Equipment selection**
- **Product selection**
- **Competition in market**
- **Quality assurance**

SERVICES

- 1. Consultancy**
- 2. Technical Services**
- 3. Technology Transfer**
- 4. Testing Facility**
- 5. Sponsored Project**
- 6. Pilot Plant Facilities**
- 7. Training in Human Resource Development**
- 8. Food Science & Technology Information Services**

CUSTOMER KNOWLEDGE

- **Know about the literature**
- **Know about the market**
- **Know about the source of finance**
- **Area where we want to set up the plant**
- **Source of technology**

COMMUNICATION CHANNEL

- o **Standard Information**
- o **Non technical report**
- o **Update Non technical report**

COUNSELLING

Counselling in CFTRI to give the suggestion of potential entrepreneurs either 1st generation entrepreneurs, 2nd generation entrepreneurs or 3rd generation entrepreneurs with regard to implementation of technologies.

Purpose of Counselling

- 1. Description about technology**
- 2. Importance of technology**
- 3. Market potential**
- 4. Financial sources**
- 5. Government schemes**
- 6. Project feasibility**
- 7. Project profile**

FOCUS OF COUNSELING

- 1. Place of raw materials availability**
- 2. Forecasting of raw materials**
- 3. Market survey**
- 4. Area survey**
- 5. Plant & equipment selection**
- 6. Process selection**
- 7. Cost of plant & machinery**
- 8. Training & Demonstration**
- 9. Guidelines for Agreement between entrepreneurs and institute**
- 10. Product development**

PACKAGE OF SERVICE FOR KNOW HOW TRANSFER

- ❖ **Licensing of the process**
- ❖ **Technical Dossier**
- ❖ **Supply of design drawings**
- ❖ **Demonstration of Process Know-how**
- ❖ **Plant & building layout- for a model unit**
- ❖ **Feasibility report-for a model unit**
- ❖ **Technical guidance**
- ❖ **Training of personnel**
- ❖ **Quality control management**
- ❖ **Product testing and analysis**
- ❖ **Enrollment in database as CFTRI licensee**

A. PROCESS KNOW-HOW

1. PRODUCT

- 1.1 Use
- 1.2 Specifications
- 1.3 Standards
- 1.4 Packaging & Storage -
Specifications

2. BY-PRODUCTS

- 2.1 Use
- 2.2 Specifications
- 2.3 Standards

3. RAW MATERIALS

- 3.1 Specifications
- 3.2 Standards

4. PROCESS DETAILS

- 4.1 Process description
- 4.2 Flow diagram
- 4.3 Material & energy balance
- 4.4 Process parameters
- 4.5 Critical steps
- 4.6 Detailed equipment specifications
(for an economically viable unit)

5. QUALITY ASSURANCE

- 5.1 Laboratory facilities
- 5.2 Methods

B. THE PROJECT REPORT

6. PROJECT COST : ESTIMATE

7. PLANT & EQUIPMENT

7.1 Equipment specifications (short)

7.2 Plant Layout

7.3 List of suppliers of equipment

7.4 General building requirement & layout

8. PROJECT ECONOMICS

Estimate

10 - year cash flow

Profitability analysis

9. GENERAL ASPECTS

9.1 Any special regulations concerning production or product

9.2 Critical inputs- ingredients or equipment, their availability, indigenous or import

9.3 Nature of effluents and wastes, recommended disposal

10. MANPOWER

11. MARKET FOR PRODUCTS

Present and potential *

VIRGIN COCONUT OIL

VCO is been recognized for its **quality of strengthening the structure of damaged, devitalized hair**. It **lubricates and softens the hair shaft** through the action of minerals such as magnesium, potassium, calcium and iron. As a “functional food”, the medical community as powerful tool against an immune disease, this acts as **antibacterial, antiviral and anti-fungal**.

PROJECT COST – FIXED COST – WORKING CAPITAL (in Rs. ‘000) (Estimate for a model project)

a) Land & Land development (600 m ²)	210.00
b) Building and civil works (300 m ²)	300.00
c) Plant and machinery	1700.00
d) Auxiliary equipments	408.00
e) Other fixed assets	50.00
f) Pre-operative expenses	278.00
Total fixed capital	2946.00
Working capital margin	325.00
Total Project cost	3271.00



1000 Coconuts – 60 Liters of Virgin Coconut Oil
Transferred to ----- number of entrepreneurs

COCONUT BEVERAGE FROM TENDER COCONUT

The tender coconut beverage can be packaged, distributed and sold commercially with high keeping quality due to the presence of **natural electrolytes, refreshing and fresh taste of coconut**. Production of tender coconut beverage **without any artificial flavouring agents** has nice market to cater the consumers with high awareness who prefer least chemical additives.

Project Cost – Fixed Cost – Working Capital (in Rs. '000) (Estimate for a model project)

Land 600 Sq. m	300.00
Building 300 Sq. m	450.00
Plant and equipment	5832.00
Preliminary and preoperative expenses	800.00
Working capital	671.00
Total project cost	8053.00



Daily production: 5000 Tender coconuts/ day/ Shift (1875000 bottles of 200 gm per annum)

Working: 300 days

VALUE ADDED PRODUCTS FROM COCONUT

- **Instant adjunct mix:** This is a ready to reconstitute spiced mix having coconut and rice flakes as major ingredients.
- **Instant filling mix:** This is a ready to reconstitute low moisture product that is nutraceutically enriched with the addition of flax seed and sesame seed
- **Coconut rice mix:** Filling powder is a ready to reconstitute coconut based product that can be used as a stuffing in many traditional sweet preparations
- **Coconut bites:** Coconut bites is a ready to eat snack having characteristic flavor of fresh coconut. Variations in the taste can be made by using different flavours during product preparation.

PROJECT COST – FIXED COST – WORKING CAPITAL (in Rs. '000)

(Estimate for a model project)

	Instant coconut rice mix	Instant adjunct mix	Instant filling powder	Coconut bites
Land 500 Sq. m	125.00	125.00	125.00	125.00
Building 150 Sq. m	600.00	600.00	600.00	600.00
Plant and equipment	520.00	1000.00	1360.00	1300.00
Preliminary and preoperative expenses	250.00	300.00	300.00	312.00
Working capital	200.00	200.00	280.00	240.00
Total project cost	1695.00	2225.00	2665.00	2577.00

Production	Working
250 kg product/ day	300 days

BLEND OF COCONUT OIL WITH OTHER EDIBLE OILS

The process consists of the preparation of coconut oil blend with other vegetable oils such as groundnut, sunflower, safflower, soyabean oils with efficient blending under controlled conditions to get nutrient rich coconut oil blend. The blend has been made in such a way that the fatty acid composition to contain saturates of medium chain length, monounsaturates and polyunsaturates and contains endogenous tocopherols, or tocotrienols and oryzanol or tocopherols and lignans. It is free of trans fats. The product has shown excellent stability during the storage study and retention of nutraceutical components. The product has good acceptability with respect to colour, appearance and taste and strictly follows the PFA norms.

Project Cost – Fixed Cost – Working Capital (in Rs.‘000) (Estimate for a model project)

a) Land & Land development (690 m ²)	517.5
b) Building and civil works (230 m ²)	1150.0
c) Plant and machinery	4240.0
d) Auxiliary equipments	50.0
e) Other fixed assets	20.0
f) Pre-operative expenses	543.5
Total fixed capital	6521.2
Working capital margin	3644.7
Total Project cost	10165.9



Production Capacity- (estimate):

- Suggested economic capacity: 5000 kg of blended oil/day (one shift)
- Working: 300 days per annum

DESICCATED COCONUT

Desiccated coconut is the disintegrated and dehydrated kernel from mature coconuts. Desiccated coconut is manufactured from the fresh mature nuts. Shredded coconut is usually produced in seven grades. In the order of their fineness, they are – macaroon, fine, medium, coarse, chips, tapes and shreds. The fine and medium grades are largely exported. The demand basically exists for the fine and medium grades of desiccated coconut resembling coarse soji.

Project Cost – Fixed Cost – Working Capital (In Rs. '000)

(estimate for a model project)

a) Land (1000 m ²)	100.00
b) Building (200 m ²)	500.00
c) Plant and machinery	1000.00
d) Miscellaneous fixed assets	100.00
e) Pre-operative expenses	100.00
Total fixed capital	1800.00
Working capital margin	235.00
Total Project cost	2035.00

Moisture – 2.3%

Fat – 65 – 68%

SNF: 30-32%

1000 Coconut (500 Kg) – 100 Kg finished product

Transferred to ---- number of entrepreneurs

PRODUCTION CAPACITY - estimate

Suggested economic capacity: 250 Kg of desiccated coconut per shift

Working days/annum : 2 shifts/ day; 300 working

Installed capacity : 150 tonnes/annum

SPRAY DRIED COCONUT MILK POWDER

Coconut milk is white milky produce extracted from the endosperm of coconut and constitutes into an emulsion stabilized by proteins. It has a characteristic nutty flavour and also is known for its **nutritional values**. It is an ingredient for **sweets, confectioneries, vegetable dishes, beverages, sharbats, fish, meat, poultry** and other type of **preparations**. Spray dried coconut powder can be used in **formulations of Flavoured milk, Milk shake, Lassi, Coconut rice, Coconut puddings, Coconut burfi, Coconut savory and other Indian traditional products**.

Project Cost – Fixed Cost – Working Capital (In Rs. ‘000) (estimate for a model project)

Land (20000 M ²)	22.20 Lakhs	Moisture : 2%
Building (1527 M ²)	74.27 Lakhs	Fat : 66 – 72%
Other fixed assets	18.00 Lakhs	SNF: 30-32%
Preliminary / Preoperative expenses	23.90 Lakhs	
Cost of plant/equipment:	143.83 Lakhs	
Working capital (margin)	18.33 Lakhs	
Total Project Cost:	300.53 Lakhs	

1000 Coconut (500 Kg) – 50 Kg finished product

Transferred to ---- number of entrepreneurs

Capacity of Plant: 20,000 nuts per day or 1-ton spray dried powder per day

PRODUCTION OF COCONUT SPREAD BASED ON MATURE COCONUT WATER CONCENTRATE AND COCONUT DIETARY FIBRE

Process for the development of coconut spread based on mature coconut water concentrate and coconut fiber, which are the by-products from coconut processing industries. The product obtained is having **typical favour/ sensory attributes of coconut**. This exotic spread can find **extensive utilization in sandwiches, chapathi, dosa or similar breakfast foods** to make them more appealing and appetizing

Project Cost – Fixed Cost – Working Capital (in Rs. ‘000)

(Estimate for a model project)

Land 400 Sq. m	200.00
Building 200 Sq. m	320.00
Plant and equipment	1000.00
Preliminary and preoperative expenses	350.00
Working capital	460.00
Total project cost	2330.00



CAPACITY

Daily production: 100kg product/ day

Working: 300 days

NEERA BOTTLING

It is well known that the freshly tapped neera ferments very quickly to become 'toddy'. It is in this context a process has been developed to preserve neera thermally in glass bottles. Process consists of collecting the coconut sap early in the morning in a hygienic condition, transporting immediately to the laboratory in a chilled condition, clarifying the sap, adjusting the pH of the sap, blending with certain additives followed by filling in glass bottles, sealing with crowns and pasteurization.

Project Cost – Fixed Cost – Working Capital (in Rs. '000) (Estimate for a model project)

a) Land & Land development (500 m ²)	125.00
b) Building and civil works (300 m ²)	1200.00
c) Plant and machinery	3800.00
d) Miscellaneous fixed assets	150.00
e) Pre-operative expenses	500.00
Total fixed capital	5775.00
Working capital margin	1350.00
Total Project cost	7125.00

Production Capacity- (estimate)

Suggested economic capacity	: 1000 Liters/day (5000 bottles per day)
Working Capacity	: 300 working days/year
	: 300000 Litres /annum



NUTRI OIL BLENDS

The process consists of the preparation of two nutri oil blends based on rice bran oil (RBO) and ground nut oil (GNO) with efficient blending with other nutrient rich oils. These blends have been made with such a way that the fatty acid composition has been balanced with respect to **saturates, monounsaturates and polyunsaturates** and **contains endogenous β -carotene, tocopherols, tocotrienols and oryzanol & tocopherols and tocotrienols** respectively. The products have shown excellent stability during the storage study and retention of nutraceutical components. The products have good acceptability with respect to colour, appearance and taste.

Project Cost – Fixed Cost – Working Capital (in Rs.‘000) (Estimate for a model project):

a) Land & Land development (750 m ²)	172.5
b) Building and civil works (250 m ²) including ponds	920.0
c) Plant and machinery	3966.2
d) Auxiliary equipments	50.0
e) Other fixed assets	20.0
f) Pre-operative expenses	484.1
Total fixed capital	5612.8
Working capital margin	3552.7
Total Project cost	9165.5

Production Capacity- (estimate):

Suggested Capacity : 5000 kg blended oil

Working : 300 days per annum

Production per day : 5000 kg of blended oil

A vibrant bouquet of flowers, including tulips and roses in various colors like red, yellow, pink, and white, is shown. The text "THANK YOU" is overlaid in a stylized, outlined font across the center of the bouquet.

THANK YOU