## The Complete Technology Book on Printing Inks

Author: NIIR Board Format: Paperback ISBN: 8178330482

Code: NI109 Pages: 640

**Price: Rs.** 1,000.00 **US\$** 26.95

Publisher: Asia Pacific Business Press Inc.

Usually ships within 5 days

The beginning of ink making is something of a mystery. It is certain however, that the development of the art of writing preceded the invention of ink by almost a thousand years. Today inks are divided into two classes: printing inks and writing inks. Printing is a process for reproducing text and images, typically with ink on paper using a printing press. It is often carried out as a large scale industrial process, and is an essential part of publishing and transaction printing. Different techniques and printing equipments are employed for each printing practices. The demand for innovative printing practices has been on a high in recent times. There are various kinds of printing processes; lithographic process, the gravure process, offset printing process etc. different types of inks derived from different processes are ball pen inks, bleachable inks, fluorescent inks, fast drying ink, automatic press inks, rotary press inks, coated paper inks, planographic inks, lithographic inks, offset tin printing inks etc. The Printing Ink industries have grown significantly during the last decade and this industry is characterized by exceeding high margin profit. As we read newspapers, magazines, and books on a daily basis therefore inks are found in almost every aspect of human activity. The worldwide printing inks market is projected to register a CAGR of about 2.8%. Printing inks market embodies the strength of the global as well as regional economies. With its high correlation to a national GDP, the printing inks market is cyclical in nature, with economic ups and downs amplifying the demand patterns. The world printing inks market is projected to grow moderately over the next couple of years.

The major contents of the book are pigment in the printing inks, manufacturing of printing inks, storage and testing of raw materials, planographic inks, lithographic inks, factors effecting visual appearance of ink film, factors effecting visual appearance of ink film, method of mixing metallic powder and varnish, the principle of reproducing photographs by printing methods, etc.

In this book an attempt has been made to bring together the useful manner as possible the fundamental Principles of ink making. The book contains formulae processes and other relevant information of the manufacturing of different types of printing inks.

## **Contents**

- 1. Introduction
- 2. Printing Inks
- 3. Printing Ink Vehicles
  Vegetable Drying Oils
  Linseed Oil and Linseed Oil Varnishes
  Lithographic Varnish
  China Wood Oil or Tung Oil
  Soya Bean Oil
  Perilla Oil

Other Vegetable Drying Oils

The Vegetable Semi-Drying Oils

Cottonseed Oil

Rapeseed Oil

The Vegetable Non-Drying Oils

Mineral Oils

**Animal Oils** 

Terrestrial Animal Oils

Marine Animal Oils

Rosin Oils

Pitch Varnishes

4. Pigment in the Printing Inks

**Pigments** 

Nature

Minerals

Carbonic sources

Botanical

From animals

Black Pigments

Lamp black

Russian black

Coal or gas

Wooden coal

Ivory coal

Bones

Parish black

Lead and graphite

Composition black

White Pigment

White lead

Antimony

Chinese white

Transparent white

Blainfix white

Yellow Pigments

Chrome yellow

Cadmium yellow

Ochres yellow

Gummy material

Minerals

Red Pigment

Vermillion

Carmine

Lac

Lake pigment

Kothenial lake

Madar

Blue Pigment

Prusian blue

Ultramarine blue

Reflex blue

Oriental blue

Cobalt blue

Indigo blue

Green Pigment

Emerald green

Chrome green

5. Manufacturing of Printing Inks

Storage and Testing of Raw Materials

Mixing operation

Mixing machines

Milling process

Delivery part of the machine

Quality control

Packing and selling

6. Typographic Printing Inks

Job Press Inks

Job Black

Job Press Bright Red

Job Press Green

**Automatic Press Inks** 

Automatic Press Black

Automatic Press Red

Flatbed Cylinder Press Inks

Cylinder Press Black

Cylinder Press Peacock Blue

Rotary Press Inks

Rotary Press Red

Rotary Press Black

Web Press Inks

Web Press News Black

Perfecting Press Red

The Relation of Ink to Stock

Bond and Ledger Paper Inks

Bond Bronze Blue

Bond Black

Coated Paper Inks

Coated Paper Red

Coated Paper Yellow Lake

Super-calendered Paper Inks

Super Paper Red

Super Paper Blue

Parchment Paper Inks

Parchment Black

Parchment Red

Carton Stock Inks

Carton Yellow

Carton Red

Inks for Machine Finished Paper

Machine Finished Red

Machine Finished Blue

Glassine and Cellophane Inks

Glassine Violet

Glassine Green

Halftone Black Inks

High Grade Halftone Black

Publication Halftone Black

Process Inks

Process Transparent Yellow

Process Blue

Process Red

7. Planographic Inks

Lithographic Inks

High Grade Lithographic Black

Lithographic Peacock Blue Ink

Lithographic True Blue

Offset Printing Inks

Offset Red for Lake C

Offset Milori Blue

Offset Tin Printing Inks

Tin Printing Reddish Blue

Tin Printing Medium Yellow

Dry Offset Printing Inks

Dry Offset Red for Lake C

Dry Offset Bronze Blue

Photogelatin Inks

Photogelatin Blue

Photogelatin Black

8. Intaglio Printing Inks

Copper Plate Engraving Inks

Copper Plate Black

Copper Plate Blue

Steel Plate Engraving Inks

Steel Plate Black

Toner Blue Ink for Plate Black

Steel Plate Orange

Stamping Inks

Gloss Stamping Red

**Dull Stamping Black** 

Photogravure Inks

Photogravure Picture Black

Photogravure Brown

Rotary Photogravure Inks

Plateless Engraving or Thermographic Inks

Dense Black for Plateless Engraving

True Blue for Plateless Engraving

9. Printing Inks and Colour

Subtractive Theory of Colours

Additive Theory of Colours

Reproduction of Colour By Printing Ink

Classification of Colours

Primary colours

Secondary colours

Tertiary colours

Examples of tertiary colours

Factors effecting visual appearance of ink film

Influence of colours

Cold colours

Warm colours

Terminology Related to Colour Contrast Harmony Hue Tint Shade Tone Analogous colours Complementary colours Density in colour Transparent and opaque colours 10. Qualities of Offset Inks Working Qualities **Optical Qualities** Effects After Printing 11. Gravure Printing Inks Characteristics of Gravure Inks Vehicles in the Gravure Inks Considerations for Purchasing Inks 12. Printing Inks for Letterpress News ink Inks for platen and cylinder machines Moisture-set inks Important Points Quick-set inks Cheque inks Heat-set inks Important Points Metallic inks Method of mixing metallic powder and varnish Precautions Aniline inks Neo-set Inks 13. The Nature of Printing Ink The Three Main Printing Systems Typographic Method

Lithographic Method

Intaglio Method

General Properties of Letterpress Inks

The Silk Screen Method

The Principle of Offset Printing

Methods of Ink Drying

Relation between the Printing Process, Ink, And Paper

The Principle of Reproducing Photographs by Printing Methods

The Actinic Tanning of Gelatine

Letterpress Half-tone Plate Reproduction

The Principle of Photogravure

Half-tone Printing Using Dots Letter Press (or Litho)

Photogravure Printing Using Square Cells

Print Recognition

Differences in Litho and Offset-Litho Printing

Differences in Typographic Printing

14. The Colloidal Nature and Rheology of

Printing Inks

Ink Compared to Colloidal Dispersions

Flocculation

Types of Flow

Fluidity

Newtonian Flow

**Plasticity** 

Plastic Flow

Consistency

Thixotropy

Measurement of Thixotropy

Pseudo-plastic Flow

Dilatant Flow

The Empirical Flow Test

Rheological Specifications of An Ink

Flow Requirements of Letterpress Inks

Supply of Ink from the Duct

Behaviour of Ink in the Duct

Distribution of Ink on the Press

Impression

Special Flow Requirements of News Inks

Flow Requirements of Offset Inks

Flow Requirements of Copper-plate Inks

Ink Tack

Nature of Tack

Measurement of Ink Tack

Elasticity and Plastic Flow

Elasticity

Relaxation Time

Fundamental Rheological Properties

15. Inorganic Pigments and Extenders

Nature of Pigments

The Oil Adsorption of Pigments

**Opaque White Pigments** 

Transparent White Pigments And Extenders

Barytes And Blanc Fixe

Alumina Hydrate

Gloss White

Whiting or Chalk, Caco3

Mica

Silica, Sio2

Magnesium Carbonate

The Use of Extenders In Printing Inks

Ultramarine

Bronze Blue, Iron Blue, Or Ferrocyanide Blue

**Lead Chromes** 

Orange Basic Chrome

Chrome Red

Molybdade Orange and Molybdated Scarlet Chrome

Zinc Chrome on Zinc Yellow

Cadmium Pigments

Red Lead, Pb3o4

Vermilion, Hgs

Brunswick Green And Milori Green

Zinc Chrome Greens

Guignet's Green, Chrome Oxide Green

Natural Iron Oxide Pigments

Manufactured Iron Oxide Pigments

Uses of Inorganic Pigments in Printing Inks

16. Ink in Relation to Paper

The Nature of Paper

The Fundamentals of Paper Making

Conversion of Raw Materials to 'Half Stuff'

Rag Half Stuff

**Esparto Half Stuff** 

The Treatment of Wood

Sulphite Method For Chemical Wood

Caustic Soda Method For Chemical Wood

Soda Sulphate Method For Chemical Wood

Mechanical Wood Treatment

**Beating** 

Hand-made Paper

Machine-made Paper

Methods or Glazing Paper

Special Finishes

**Opacity Improvements** 

Watermarking

Wove, Laid, and Twin-wire Paper

Storage of Printing Papers

Paper Troubles And Remedies

Fading of Tinted Printings

Fluffing or Dusting

Picking or Plucking

Static Electricity In The Stock

Types of Printing Paper

The Penetration of Ink Into Paper

Measurement of The Penetration of Ink into Paper

The Penetration of Slow-drying Inks Into Paper

Drying by Absorption

The Transfer of Letterpress Inks from Forme to Paper

Complete Contact of Paper Surface with Ink Film

Maximum Ink Acceptance Capacity of the Paper

Excess Ink on the Forme

General Requirements of Printing Paper

Printability of Offset Paper

General Requirements of Printing Ink in Relation to Stock

17 The Typographic Process

Stereotypes

Half-tone Engravings in zinc and Copper

Line Blocks

**Printing Machines** 

The Hand Press

Platen Machines

Vertical Platen Machines

Automatic Platens

Cylinder Machines

The Vertical Miehle

Miehle Two-revolution Cylinder Machine

Letterpress Rotaries

Machine Design And Make-ready in Relation to Ink

Letterpress, Typographic, or Relief Printing Inks

Factors Involved In Formulating the Ink

Making Platen and Cylinder Inks

Rotary News Inks

Type of News Ink Formulation

Ink Spray or Fly.

Berk's Heat-set Black News Ink

Flated News Inks

Type of Flatbed News Ink Formulation

Cheap Magazine Inks

Type of Cheap Rotary Magazine Ink

Slow-speed Rotary Magazine Inks

Formulation

Uses

Drying Oil Black Ink

Letterpress Inks Based on Special Varnishes:

Non-reactive Resin in Drying Oil

Non-reactive Resin in Drying-oil Ink

Letterpress Inks Based on Synthetic Resins

Letterpress Ink Formulations

Thinning and Reducing Platen and Cylinder Inks

Double-tone Letterpress Inks

I.C.I. Double-tone Letterpress Inks

Yellow-black Double-tone Ink

Nitrocellulose Inks

Special Letterpress Inks

Letterpress Ink Worries and Cures

Caking

Collecting Dirt

Colour Drift or Colour Variation

Colour Fade

Crystallization

Fast Drying Ink

Ink Flying or Spraying

Ink Retreat From Fountain Roller

Insufficient Gloss

Mottle

Picking or Plucking

Powdering or Chalking

Repeats or Ghost Duplicates

Set-off or Offset

Show-through

Slur

Trapping

Wipe

18. Special Inks

Ball Pen Inks

Bleachable Inks

Fluorescent Inks

Phosphorescent Pigments

Fluorescent Pigments

Pigment Manufacture

**Printing** 

Silk-screen Fluorescent Printing

**Power Press Printing** 

Invisible or Sympathetic Inks

Heat-sensitive Type

Water-sensitive Type

Chemically-sensitive Type

Metallic Inks

**Pigments** 

Stock

Media

Letterpress Metallic Inks

Gravure Metallic Inks

Silk-screen Ceramic Metallic Inks

Printing Metallic Inks

Pigmentation

Summary

Washable Fabric Inks and Textile Marking Inks

Water-colour Inks

Inks for Special Reuirements

Low Odour Inks

Rub-resistant Inks

19. Natural Resins, Modified Natural Resins, and Bituminous Materials

Nature of Resins

Classification of Resins

Congo Copal

Manila Copal

Sierra Leone Copal

Zanzibar Copal

Amber

Damar

Rosin or Colophony

Rosin Oil

Polymerized Rosin

Hydrogenated and Oxidized Rosins

Tall Oil

Shellac

Sandarac

Mastic

Zein

Modified Natural Resins

Ester Gum

Lime-hardened Rosin

**Bituminous Materials Nature** 

**Asphalts** 

**Bitumens** 

**Pitches** 

Firnigrals and Iranolins

Uses in Printing Inks

20. Aniline, Dye-spirit, or Flexographic Inks

Transparent Aniline Inks

Uses And Advantages

Basic Dyes Suitable for Transparent Aniline Inks

Media

Pigmented Flexographic Inks

Synthetic Resins For Spirit Inks

Maleics

Pure Phenolics

Unesterified Rosin Modified Cresol-formaldehyde

Resins

Unesterified Rosin Modified Phenol-formaldehyde Resins

Miscellaneous Phenolics

Ketone-aldehyde Base Synthetic Resins

Spirit Type, Flexographic Ink Formulations

Flexouraphic Inks Not Based On Alcohol

**Aniline Machines** 

21. Drying Oils,

The Nature of Drying Oils

The Acids Present In Drying Oils

Properties of Semi-drying Oils

Linseed Oil

Production of Raw Linseed Oil

The Refining of Linseed Oil

Bleaching of Refined Linseed Oils

Comparison of the Properties of Acid

**Boiled Linseed Oil** 

Blown Linseed Oil

Heat-bodied Linseed Oil Or Stand Oil

Plant For Making Stand Oils

Catalysts For Bodying Linseed Oil

Improved Stand Oils

The Chemical Changes in the Heat Bodying

of Linseed Oil

Tung Oil

Properties of Tung Oil

Dehydrated Castor Oil (D.C.O.)

Castor Oil

Following The Dehydration

D.C.O. Stand Oils

Blown Dehydrated Castor Oil

Perilla Oil

Oiticica Oil

Stillingia Oil

Soya Bean Oil

Sunflower Oil

Tobaccoseed Oil

The Drying Oil Fatty Acids

Linseed Oil Fatty Acids (L.O.F.A.)

Dehydrated Castor Oil Fatty Acids (D.C.O.F.A.)

Semi-drying Oil Fatty Acids

Further Drying Oils

Improved Drying Oils By Processing

Fundamentally Modified Drying Oils

Vulcanized or Sulphurized Oils

Styrenated Oils

Maleinized Oils

**Epoxidation And Hydroxylation Of Drying Oils** 

The Use Of Drying Ois In Printing Inks

22. Printing Ink Driers or Siccatives

Nature of Ink Driers

General Use of Driers

Paste And Liquid Driers

Theory of the Promotion of Drying

Methods of Preparation of Liquid Driers

Properties of Liquid Driers

Appearance of The Driers

Standard Specifications

The Use of Driers In Printing Inks

23. Ink on Surfaces other than Paper

**General Principles** 

Cellophane Printing

Moisture-proof Viscous Film Printing

Polyethylene or Polythene Film Printing

Printing on Lacquers and Varnished Surfaces

Printing on Rubber

Printing on P.V.C.

Printing on Metal and Metal Foil

Printers' Use For Roller Coating

Roller Coatings

Cold-set Inks

24. Solvents, Diluents, and Plasticizers

**General Properties of Solvents** 

Boiling Range

Flash Point

**Evaporation Rate** 

Solvent Retention

Solvent Balance

Viscosity Changes During Drying

Solvent Power

Undesirable Solvent Properties Instability

**Bad Odour** 

**Bad Colour** 

**Impurities** 

**Toxicity** 

Petroleum Alkanes

Natural Petroleum

Petroleum Ether

S.B.P. Spirit

Petroleum Spirit, Ligroin Or Gasoline

White Spirit (W/S)

Mineral Oils

Coal-tar Hydrocarbons

Benzene C6h6

Toluene, C6H5CH3, Methyl Benzene

Solvent Naphthas

Light Naphtha

Heavy Naphtha or Aromatic White Spirit (A.W.S.)

Terpene Solvents

**Turpentine** 

Oxidized Turpentine

Dipentene, C10H16

Pine Oils

Hydrogenated Naphthalene Solvents

Decalin, C10H18

Tetralin C10H12

Alcohol Solvents

Ethanol, Ethyl Alcohol, CH3CH2OH

Isopropanol

Butanol CH3CH2CH2CH2OH

Methyl Isobutyl Carbinol (M.I.B.C.)

Diacetone Alcohol Or Dical

Benzyl Alcohol C6H5CH2OH

Glycol Solvents

Ethylene Glycol HO.CH2CH2OH (E.g.)

Diethylene Glycol HO.CH2CH2O.CH2CH2OH. (D.E.G.)

Propylene Glycol Ch3.CHOH. CH2OH (P.G.)

Dipropylene Glycol HO. (CH2)3.O. (CH2)3OH (D.P.G.)

Hexylene Glycol, 2 Methyl, (2, 4) Pentanediol (H.G.)

**Ethers** 

Di-ethyl Ether, C2H5.O. C2H5

The Ether Alcohols or Cellosolves

Methyl Cellosolve / CH3.O.(CH2)2.OH

Cellosolve, Ethylene Glycol Monoethyl Ether

Butyl Cellosolve CH3.(CR2)3.O.(CHZ)2OH

The Carbitols

Carbitol

Methyl Carbitol

Ketones

Acetone

Methyl Ethyl Ketone (M.E.K.) CH3.CO. C2H5

Methyl Isobutyl Ketone (M.i.b.k.)

Isophorone, C9H14O

Sextone B, Methyl Cyclohexanone

Acetonyl Acetone, 2.5 Hexanediol

Furfural

Ester Solvents

Butyl Acetate. C4h9.coo.ch3

Butyl Lactate C4H9COO.CHOH.CH3

**Plasticizers** 

Di-butyl Phthalate (D.B.P.)

Tri-phenyl Phosphate (T.P.P.)

Tri-cresyl Phosphate (T.C.P.)

Triacetin

Ethyl Abietate

Solvents From Petroleum

25. Printing Ink Carbon Blacks

Carbon Black

Manufacture of Impingement Channel Blacks

Furnace Combustion Blacks

Furnace Thermal Decomposition Blacks Lamp Black Charcoal Black Bone Black

Mineral Black Graphite

Cabot Nigrometer Scale

26. Waxes

Nature of Waxes

Mineral Waxes

Paraffin Wax

Microcrystalline Wax

Petroleum Jelly

Ozokerite

Montan Wax

Vegetable Waxes

Carnauba Wax

Candelilla Wax

**Animal Waxes** 

Beeswax

Wool Wax or Lanolin

**Tallow** 

Synthetic Waxes

Carbowaxes

Condensation Waxes or Glycol Ester Waxes

Acrawax

Chlorinated Naphthalenes

Polyethylene Waxes

Polyamide Waxes

Other Waxes

Uses of Waxes in Printing Inks

27. Selection of Media and Pigments for Printing

Suitability of a Resin for Letterpress and

Planographic Inks

Suitability of a Resin for Gravure Inks

Common Film Defects

Blooming or Blushing

Bubbling

Chalking

Checking

Cissing

Cracking or Flaking

Orange Peel

Pin-holding or Pitting

Wrinkling or Shrivelling

Webbing

Selection of Pigments

Comparison of Bronze, Ultramarine, and Monastral Blues

Nature of the Pigments

Masstone

Reduced Tones

Density and Oil Adsorption

Ease of Grinding

Resistance to Soap, Fats, Solvents, Water and Oils

Stability to Chemicals

Stability to Heat

Stability to Light

**Pigmentation Limit** 

Length and Rheological Properties

Expense

Special Faults

Recommendations

Comparison of Chrome, Hansa, and Benzidine Yellows

Nature of Pigments

Specific Gravity, Opacity, Oil Adsorption and Brilliancy

Grinding and Rheological Properties

Stability to Heat and Light

Stability to Acids and Alkalis

Resistance to Fat, Soap, Wax, Oil, Alcohol, and Water

Special Advantages and Defects

Four-colour Process Pigments

Madder Lake Scale Test

28. Surface-Active Agents, Anti-oxidants, And

Adhesives

Surface-active Agents

**Properties** 

Mode of Action

Evidence of Action

Types of Surface-active Agents

Lecithin

Uses in Printing Inks

Anti-oxidants

Guaiacol

Methyl Ethyl Ketoxime

Adhesives

Gum Arabic

Starch

Dextrin

29. Analysis and Calculation

**Detection of Driers in Varnishes** 

Identification of White Pigments

Examination of Ash for Inorganic Pigments

Ink Analysis

Method

Ink Technology Calculations

30. Principles of Ink Formulation

Colour Matching

Grinding

Consistency

**Drying Times** 

Length of Ink

Printed Appearance

Machine Performance

Fading

Special Requirements

31. The Intaglio Process

Copper Plate Engraving

Mezzotinting

Principles of Photogravure

Preparing the Photogravure Copper Sleeve

Rotogravure Machines

Offset Gravure

Die Stamping

Hand Die-stamping Machines

Counter-sunk Dies

Power Press Die Stamping

Intaglio Inks

Types of Media for Copper-plate Inks

Principles and Characteristics of Steel-plate

Photogravure Inks

Rotary Photogravure (Rotogravure)

Rotogravure Ink Characteristics

Simple Examples of Gravuxe Inks

Synthetic Resins for Gravure

Gravure Printing on Foil and Plastic Sheeting

Special Gravure Inks

Howard's Gravure Formulations

Die-stamping Inks

Characteristics of Die-stamping Inks

Die-stamping Media

Letterpress Imitation Die-stamping

Gravure Ink Worries and Cures

Hard and Porous Prints

Pearling

Poor Highlights

Poor Neutral Greys

Static Electricity in the Paper

Sticking When Re-reeling the Wed

Weak or Patchy Reproduction

32. The Lithographic Process

Branches of Lithographic Reproduction

Senefelder's Lithographic Stone

Modern Lithographic Plates

Photolithography

Bimetallic Plates

Trimetallic Plates

Offset Lithography

Pantone Dry Lithography

Collotype Direct Lithography

Direct Lithographic and Offset Machines

Principle of Offset Rotary Machines

Xerographic Printing

The Lithographic Process

Principle of Lithography

Essential Properties of Lithographic Inks

The Importance of Correct Ink-water Balance

Offset Ink Formulation

Conventional Direct Litho and Offset Inks

**Defective Offset Media** 

Anomalous Lithographic Drying Dry-offset Inks **Bronze Preparations** Tin Printing Offset Inks Lithographic Ink Worries and Cures **Drying Too Fast** Embossing the Blanket Fluffing Greasing Image Detail Disappears Image Thickens Ink Retreating from Fountain Roller Piling Rollers Stripping Scumming Spotty Ink Drying **Tinting** Worries Due to Using Etch 33. Directory Section

## **About NIIR**

**NIIR PROJECT CONSULTANCY SERVICES (NPCS)** is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes varies process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

NIIR PROJECT CONSULTANCY SERVICES, 106-E, Kamla Nagar, New Delhi-110007, India. Email: npcs.india@gmail.com Website: NIIR.org