

# **The Complete Book on Cold Storage, Cold Chain & Warehouse (with Controlled Atmosphere Storage & Rural Godowns) 5th Edition**

**Author:** Ajay Kumar Gupta

**Format:** Paperback

**ISBN:** 9788195577521

**Code:** NI292

**Pages:** 376

**Price:** Rs. 1,650.00 **US\$** 43.95

**Publisher:** NIIR PROJECT CONSULTANCY SERVICES

Usually ships within **5** days

A cold storage facility preserves fruits and vegetables for a longer period of time. Entrepreneurs and MSMEs in the food and beverage industry are the most likely to choose this business. Cold Storage is a one-time investment industry with a significant initial outlay. In comparison to other small firms, however, the returns are higher and on a long-term basis.

The overall average capacity utilisation in cold storage is 75%, indicating the cold chain business in India's long-term viability. Private companies own and run 92 percent of cold storage facilities in India. A cold storage warehouse can maintain your goods at the proper temperature for long periods of time. The term "cold chain" refers to the process of controlling the temperature of perishable goods from point of origin to final consumer in order to ensure quality and safety.

The global Cold Storage Market is expected to grow at a CAGR of 14.10 percent. The global demand for processed foods, perishable foods, and medical equipment is increasing. Increased technical innovation is another influence in the cold storage sector. Cold storage is being promoted by government legislation around the world about the safety precautions for storing temperature-sensitive food and medical products. The book covers a wide range of subjects relating to start Cold Storage Business. It also offers information on machinery suppliers, as well as photographs of the equipment and plant layout.

A detailed guide to the Cold Storage industry and entrepreneurship. This book serves as a one-stop shop for everything you need to know about the Cold Storage Business, which is ripe for manufacturers, merchants, and entrepreneurs. This is the only book on the market that covers all aspects of commercial cold storage start-up. It's a veritable feast of how-to information, from concept through equipment procurement.

## **Contents**

### **INTRODUCTION**

History of Cold Storage

Efficient Cold Storage Management

Clean and Calibrate

Know Your Hot and Cold Spots

Pre-cool

Use Humidifiers

Avoid Air Pollution

Rotate Your Product

Inspect the Quality of Your Product on Arrival

Keep Score

Selection of Location for the Cold Storage

Cold Storage Chain

Emergence of Cold Chain Logistics

Providing Temperature Controlled Environments

Refrigerated Containers

## 2. CONTROLLED ATMOSPHERE STORAGE

Importance of Controlled Atmosphere

Fruits and Vegetables Storage under CA

Indoor Storage

Outdoor Storage

Harvesting Apples at Optimum Maturity

Guidelines for Placing Apples into CA Storage

Temperature and Carbon Dioxide Interactions on Quality of Controlled Atmosphere-stored Apples

Pears

The Use of Cooling and Cold Storage to Stabilize and Preserve Fresh Stone Fruits

Ethylene Concentrations in Controlled Atmosphere Storage

Construction

Sealing Walls and Ceilings

Wall to Floor Joints

CA Doors

Observation Window

Penetrations

## 3. REFRIGERATION

Refrigerated Rail Cars

Planning a Cold Storage

Cold Store Capacity

Refrigeration Plant Requirements

Compressors

Power Requirements

Methods of Refrigeration

Capacity Rating

Factors Limiting Storage Life

Cost of Freezing

Care and Cleanliness

Working in Cold Rooms

Vapour Barriers

Types of Cold Stores

Prefabricated Cold Stores

Layout of a Typical Cold Store

The Drying Process of Potatoes

The Curing Process of Potatoes

Increasing the Temperature of the Potatoes After Storage

Electrical Installation

Substation

General Specifications for Refrigeration System

Refrigeration Processes

Thermal Insulation & Refrigeration System, Control and Safety Devices

Refrigeration Cycles

Types of Compressors

Piston Compressors

Rotary Compressors

- Screw Compressors
- Vapour Compression Cycle
- Compressor
- Condenser
- Receiver
- Evaporator
- Rooms for machines, Electricals etc.
- Typical Specifications of Refrigeration System
- Vapour Absorption System
- Ammonia Refrigeration System
- Physical Properties
- Chemical Properties
- Cold Storage for Fruits and Vegetables
- Storage Conditions
- Temperature
- Incompatibility
- Cold Storage B.I.S Specification
- Working in Cold Rooms
- Examples of Food Processing by Refrigeration and Storage
- Meat Products
- Fishery Products
- Dairy Products
- Freezing System
- Indirect Contact Systems
- Plate Freezers
- Freezers for Liquid Foods
- Direct-Contact Systems
- Immersion
- 4. FOOD STORAGE GUIDELINES FOR CONSUMERS
- Dairy Products
- Recommended Food Storage Chart
- 5. BANANAS COLD STORAGE
- Conditions of Harvesting and Putting into Store
- Harvesting
- Criteria of Ripeness
- Qualify Characteristics for Storage and Transport
- Method of Storage
- 6. COLD STORAGE PLANT – AUTOMATION
- 7. ABSORPTION REFRIGERATOR
- a. Transport Handling
- b. Installation of Refrigerators and Freezers
- c. Maintenance
- d. Choice of Refrigeration Equipment
- Failures Related to Absorption Refrigerators
- a. Leaks
- b. Repair of Leaks on Cooling Units
- c. Fuel Consumption
- Comparison between Vapor Compression and Absorption System
- Compressor
- Condenser
- Receiver
- Expansion Valve
- Difference Between Refrigeration and Heat Pump System

Water-Lithium Bromide Vapor Absorption Refrigeration System

Special Features of Water-Lithium Bromide Solution

## 8. COLD CHAIN

Cold Chain Diagram

Importance of Maintaining the Cold Chain

The Effective Cold Chain

National Centre for Cold-Chain Development

Cold Chain Development in India-Modernization of the Infrastructure of Cold Storage of Perishables

Growth of Cold Storage Industry

Verification and Validation

Components of Cold Chain

## 9. COLD CHAIN AND REFRIGERATION

Health Facilities in Developing Countries

Domestic (Kitchen) and Bar Refrigerators

Types of Cold Chain Refrigerators

Cold-Chain Maintenance, Repair and Replacement

Maintenance of Equipment

Distribution and Transport

Estimation of Transportation

Cold Chain and Logistics Management

Costs of Cold Chain and Logistics Management

Importance of Cold Chain and Vaccine Logistics Management

Electrical Cold Chain Equipments

Walk-in-Freezers (WIF)

Walk-in-Coolers (WIC)

Deep Freezer

Cold Chain Management

Maintenance of the Vaccine Refrigerator

Cold Box

Cold Boxes: Types and Usage

Uses

Ice Manufacture

Applications of Refrigeration in Different Food Products

Frozen Food Properties

Refrigerator Thermometers

Monitoring of the Refrigerator Temperature

Fridge Failure or Disruption of the Cold Chain

## 10. SHIPPING CONTAINERS

Refrigerated Container

Shipping Container Features

Comparison of Passive and Active System

Transport Operations

The Role of the Transport Operator

Distribution Vehicles

Air Circulation

Dispatching Product

Air Flow

The Essential Data Logger

## 11. THE COLD-CHAIN MONITOR

How to Use the Cold-Chain Monitor in Routine Forwarding of Vaccine Shipments

The Vaccine Vial Monitor

Proportion of Regional Vaccines Carrying VVMs

Recommendations on Improving Availability and Use of VVMs

Availability  
Use  
Cold Storage Temperature Legislation  
Why Set -18°C for Thermal Stabilisation?  
Vaccine Damage  
Heat Damage  
Solar Refrigerators  
Components of Solar Refrigerator  
12. COLD STORAGE FOR FISH AND MEAT  
Introduction  
Uses of Ice  
Cold Storage Life of Frozen Fish  
Cold Storage for Meat  
Chilled Storage  
Parameters Considered for the Design  
Site Selection  
Storage Temperature  
Rate of Freezing  
Relative Humidity  
Calculation of Refrigeration Loads  
Material Selection  
Insulating Material  
Meat Supply Cold Chain Management  
Cold Chain in Slaughterhouse  
Air Chilling  
Immersion Chilling  
Spray Chilling  
Vacuum Chilling  
13. WAREHOUSE  
Cold Storage Warehouse Construction  
Warehouse Cum Cold Storage  
Central Location  
Value-Adding Operation  
Need for Warehousing  
Types of Warehouses  
Advantages  
Disadvantages  
Functions  
Advantages of Public Warehousing  
Disadvantages of Public Warehousing  
Advantages of Private Warehousing  
Disadvantages of Private Warehousing  
Sequence of Warehousing Decisions  
Determination of Storage Capacity  
Fixation of Storage Charges  
Storage Systems  
Basic Warehouse Equipment  
14. NABARD WAREHOUSING SCHEME  
GOI Approved Nabard Warehousing Scheme  
1. Mode of Financial Support  
2. Eligible Institutions/Entities  
3. Purpose/Activities  
4. Priority Segments

- 5. Rate of Interest, Quantum of Support and Repayment Period
- 6. Accreditation by WDRA
- 7. Implementation Period
- Department of Storage and Marketing - Initiatives
  - A. Direct Lending to State Owned Entities
  - B. Accreditation/Registration of Warehouses
  - C. Capacity Building by Stakeholders
- 15. RURAL GODOWNS
  - Subsidy
  - Size
  - Institutional Lending
    - A. Eligible Financing Institutions
    - B. Term Loan
  - Pattern of Assistance
  - Monitoring
- 16. Solar Powered Cold Storage
  - Solar PV Powered Cold Storage System
    - A View of Solar PV Panels Installed
    - Advantages of Solar PV Powered Cold Storage System
    - Cost-Economics of the Solar PV Powered Cold Storage System
    - Requirement of Cooling System
    - Solar Cold Storage System Schematic
    - Solar Powered Movable Cold Storage Structure for Perishables
    - Solar Photovoltaic System With Power Control Unit for Cold Storage
    - Use of Solar Panel & Refrigeration in Cold Storage Through Alternate Technology
    - Benefits
    - Subsidy available
    - Off Grid Solar System
    - On Grid Solar System
    - Energy efficient Hybrid Solar System for Cold Storage in Remote Areas
    - Flow Chart for Power Switching in DC Inverter Air Conditioning System
    - PV Air Conditioning in Hybrid Cold Storage with Net Metering
    - Flow Chart of an Operation of the DC Inverter Air Conditioning System
- 17. ADDRESSES OF PLANT AND MACHINERY SUPPLIERS
- 18. SAMPLE PLANT LAYOUTS
- 19. PHOTOGRAPHS OF MACHINERY WITH SUPPLIER'S CONTACT DETAILS

## 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 various 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](mailto:npcs.india@gmail.com) **Website:** [NIIR.org](http://NIIR.org)

Sun, 28 Apr 2024 09:13:54 +0530