PROJECT REPORT

ON

"SUPPLY CHAIN MANAGEMENT IN ONION DEHYDRATED PRODUCTS."

AT

JAIN IRRIGATION SYSTEMS LIMITED

FOOD PARK, JAIN VALLEY, JALGAON.

BY

KOTE PRASHANT BHAGWAT

(B.Sc.Agri)

Reg. No. 18/MC/2009/MBA

SUBMITTED TO:

MARATHWADA AGRICULTURAL UNIVERSITY, PARBHANI

In partial fulfilment of the requirements for the degree of

MASTER OF BUSINESS ADIMINISTRATION

(AGRICULTURE)

POST GRADUATE INSTITUTE OF AGRI BUSINESS MANAGEMENT
CHAKUR, DIST. LATUR

2010

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Approved by

Mr. G.R. Patil	**Dr. A. M. Degaonkar**
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POST GRADUATE INSTITUTE OF AGRI-BUSINESS MANAGEMENT

CHAKUR, DIST. LATUR

(Maharashtra)

2010

CERTIFICATE OF ORIGINALITY

This is to certify that the project entitled **"SUPPLY CHAIN MANAGEMENT IN ONION DEHYDRATED PRODUCTS"** is an original work of the student and is being submitted in partial fulfillment for the award of degree in **Master of Business Administration (Agri.)** of Marathwada Agricultural University, Parbhani.

This report has not been submitted earlier either to this University or any other University/ Institution for the fulfillment of the requirement of a course or study.

Prof. Dr.A.M. Degaonkar
Project Guide

KOTE PRASHANT BHAGWAT
Reg. No. 18/MC/2009/MBA

Place: PGIABM, LATUR

PGIABM, LATUR

Date: 10-06-2010

Jain Irrigation Systems Ltd.
Small Ideas. Big Revolutions.®
(Fruit Processing)

JISL/JV/2010 November 1, 2010

TO WHOM SO EVER IT MAY CONCERN

THIS IS TO CERTIFY THAT **MR. KOTE PRASHANT BHAGWAT** A STUDENT OF **MBA (AGRICULTURE)** FROM POST GRADUATE INSTITUTE OF AGRIBUSINESS MANAGEMENT, CHAKUR, DIST. LATUR AFFILIATED TO MARATHWADA AGRICULTURAL UNIVERSITY, PARBHANI HAS SUCCESSFULLY COMPLETED HIS PROJECT REPORT ON **"SUPPLY CHAIN MANAGEMENT IN ONION DEHYDERATED PRODUCTS"** IN OUR ORGANISATION **FROM 01ST FEBRUARY, 2010 TO 31ST MARCH, 2010.**

WE WISH HIS BRIGHT SUCCESS.

FOR **JAIN IRRIGATION SYSTEMS LTD.,**

G. R. PATIL
ASSTT. MANAGER – HRD

CERTIFICATE

This is to certify that the project entitled **"SUPPLY CHAIN MANAGEMENT IN ONION DEHYDRATED PRODUCTS"** submitted to the **Marathwada Agricultural University, Parbhani, (MS),** in partial fulfillment of the requirements for the degree of **MASTER OF BUSINESS ADMINISTRATION (AGRICULTURE)** embodies the results of a piece of bonafide work carried out by Mr. **KOTE PRASHANT BHAGWAT** Reg. No. 18/MC/2009/MBA under my guidance and that no part of the project work has been submitted for any other degree or diploma.

The assistance and the help rendered during the training period have been duly acknowledged. The suggestions made by the Evaluation Committee are incorporated in the project draft.

Place:

Prof. Dr. A. M. Degaonkar

Project Guide

Date:

Incharge Nodal Officer
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CANDIDATE'S DECLARATION

I hereby declare that the project report

Or part thereof has not been

Previously submitted by me

For a degree of any

University or

Institute.

Place: LATUR

KOTE PRASHANT BHAGWAT

Date:

Reg. No. 18/MC/2009/MBA

ACKNOWLEDGEMENT

This acknowledgement is not merely a catalogue of names but an expression of deep sense of gratitude to all those who helped me in this project directly or indirectly

With immense pleasure, I would like to present this project report. It has been an enriching experience for me to undergo my summer training at **Jain Irrigation Systems Limited**, which would not have possible without the goodwill and support of the people around. As a student of **Post Graduate Institute Of Agri Business Management,Chakur, Latur.** I would like to express my sincere thanks to all those who helped me during my practical training programme.

Words are insufficient to express my gratitude toward **Mr. Anil Jain**, the Managing Director of JISL. I would like to give my heartily thanks to **Mr. G. R. Patil**, Assistant HR, who permitted me to get training at JISL. I am very thankful to **Mr. Shivshankar Vijapuri**, (Manager-Marketing), who helped me at every step whenever needed..

As we know project work needs hard work, keen insight and long patience with,

I am immensely overjoyed to acknowledge my sincere thanks to **Prof. Dr.A.M.Degaonkar,** Internal Project Guide, for the proper guidance and assistance extended by him during my summer project.

My greatful thanks are extended to **Prof. Dr.A.M.Degaonkar, Incharge Nodal Officer.** At last but not the least I would like to thanks all my faculty members. I am also grateful to my parents and friends for encouraging and giving me moral support.

However, I accept the sole responsibility for any possible error of omission and would be extremely grateful to the readers of this project report if they bring such mistakes to my notice.

Mr. KOTE PRASHANT BHAGWAT

PGIABM, Chakur, Latur.

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EXECUTIVE SUMMARY

Onion is a term used for many plants in the genus Allium. They are known by the common name "onion" but, used without qualifiers, it usually refers to ***Allium cepa***. *Allium cepa* is also known as the **'gsarden onion'** or 'bulb' onion. The crop grown in about 175 countries, ranks third highest among seven major vegetables produced world-over.

Onions, one of the oldest vegetables known to humankind, are found in a large number of recipes and preparations spanning almost the totality of the world's cultures. They are nowadays available in fresh, frozen, canned, pickled, powdered, chopped, and dehydrated forms. Onions can be used, usually chopped or sliced, in almost every type of food including cooked foods and fresh salads and as a spicy garnish. They are rarely eaten on their own but usually act as accompaniment to the main course. Depending on the variety, an onion can be sharp, spicy, tangy and pungent or mild and sweet. Onions pickled in vinegar are eaten as a snack. These are often served as a side serving in fish and chip shops throughout the United Kingdom and are referred to simply as "Pickled Onions". Onions are widely-used in India and are fundamental to Indian cooking. They are commonly used as a base for curries or made into a paste and eaten as a main course or as a side dish. Tissue from onions is frequently used in science education to demonstrate microscope usage, because they have particularly large cells which are readily observed even at low magnifications.

Onions are perishable in nature due to high initial moisture content (about 82 percent). Presently, about 35-40 % of the onion produced is estimated to be lost in various post harvest operations in India. The quality of onions *i.e.* appearance, color, flavor and texture, deteriorates due to spoilage by organisms, enzymes, vinegar flies *etc.* during storage; and oxygen to degrade the harvested onions. The production of onions is seasonal whereas its demand prevails throughout the year. As a

consequence, there is a glut or scarcity of onions in the market. Consequently, the price of raw onion varies usually from Rs. 1.0 to Rs. 30.0 per kg, an undesirable situation to both grower as well as consumer. In order to overcome these losses, the dehydration of onion is to be adopted largely as one of the major processing operations which reduces the volume and there by transportation cost; and increases the shelf life.

This report has been exclusively prepared for Jain Irrigation Systems Ltd. (food Park). The purpose of the report is "supply chain management in onion dehydrated products". The survey results presented herein are based on the data collected from the farmers and from processing unit of onion dehydration plant.

The principle focus of the survey was to know about:

1) Onion dehydration process for export quality.
2) Performance of onion dehydrated products.
3) The quality control and food safety according to products parameter.
4) Different marketing channel for onion dehydration products.
5) The awareness of farmers about contract farming.

One questionnaire were prepared keeping in mind the above stated areas to conduct the farmers survey. The collection of responses from the farmers and from processing unit of onion dehydration plant.

The research methodology used for this survey was Exploratory Research which seeks to discover new relationship, emphasis on discovery of ideas and insights. For the Data

Collection two kinds of sources were used as;

1. Primary Source
2. Secondary Source

The survey was followed by the Convenience Sampling method. This type of sampling is chosen purely on the basis of convenience and according to convenience the places were visited. Responses were collected in structured questionnaire through direct interview of respondents. The questionnaire is designed in such a manner that it involves all possible types of questions in the same single questionnaire.

The tools used for analyzing the collected data were tabular representation, bar graphs and pie charts.

Although there are many views of supply chain management, at present, many practitioners look upon supply chain management as the management of key business processes across the network onion dehyradation organizations that from the supply chain. According to the definition given by the Global Supply Chain Forum, supply chain management is the integration of key business processes from end user to original suppliers that provides products, services & information.

The range of the subject was wide enough to cover almost all the factors considered to be effective in today scenario. This project has been undertaken to know the operators the quality & quantity of the product. This practical experience has been a great help in improving my personal attribute in the world in the field in coming future. Most of the farmers prefers the V-12 onion variety of Jain irrigation due to high productivity and high for onion dehydration processing. Majority of farmers are aware about quality of onion produce. There is need to aware the farmer about the normal TSS required for onion dehydration process. There is need of adoption of drip, sprinkler Irrigation system for onion cultivation. There is lack of onion storage facilities at farm level. There is adoption of an important curing practice for onion dehydration by growers. There is adoption of new technology for onion dehydration processing by company. Majority of farmers are aware about contract farming. Quality control measures of onion dehydrated product at grading and packing levels are preferred by Jain irrigation.

CHAPTER I

INDUSTRY PROFILE

India is one of the key food producers in the world, with the second largest arable land area. It is the largest producer of milk, pulses, sugarcane and tea in the world and the second largest producer of wheat, rice, fruits and vegetables. India's Food Processing industry is one of the largest industries in the country, it is ranked fifth in terms of production, consumption, export and expected growth.

The Indian food industry is estimated to be worth over US$ 200 billion and is expected to grow to US$ 310 billion by 2015. India is one of the world's major food producers but accounts for only 1.7 per cent (valued at US$ 7.5 billion) of world trade in this sector – this share is slated to increase to 3 per cent (US$ 20 billion) by 2015. The Indian food processing industry is estimated at US$ 70 billion. It contributed 6.3 per cent to India's GDP in 2003 and had a share of 6 per cent in the total industrial production. The industry employs 1.6 million workers directly.

The food processing industry is presently growing at 14 per cent against 6-7 per cent growth in 2003-04. The industry received foreign direct investments totalling US$ 143.80 million in 2007-08 against US$ 5.70 million in the previous fiscal. The cumulative FDI received by the industry from April 2000-January 2009 stood at US$ 760.32 million.

1.1 Indian Food Processing Industry: Structure and Composition

The Ministry of Food Processing, Government of India has defined the following segments within the Food Processing industry:

- Dairy, fruits & vegetable processing
- Grain processing
- Meat & poultry processing
- Fisheries
- Consumer foods including packaged foods, beverages and packaged drinking water.

While the industry is large in terms of size, it is still at a nascent stage in terms of

development. Out of the country's total agriculture and food produce, only 2 per cent is processed. The highest share of processed food is in the Dairy sector, where 37 per cent of the total produce is processed, of which 15 per cent is processed by the organised sector. Primary food processing (packaged fruit and vegetables, milk, milled flour and rice, tea, spices, etc.) constitutes around 60 per cent of processed foods. It has a highly fragmented structure that includes thousands of rice-mills and hullers, flour mills, pulse mills and oil-seed mills, several thousands of bakeries, traditional food units and fruits, vegetable and spice processing units in unorganised sector. In comparison, the organised sector is relatively small, with around 516 flour mills, 568 fish processing units, 5,293 fruit and vegetable processing units, 171 meat processing units and numerous dairy processing units at state and district levels.

TABLE - 1.1 SEGMENT WISE ANALYSIS:

Segment	Dairy Sector	Fruits and Vegetables	Meat and Poultry Processing	Fisheries	Packaged Foods	Beverages	Staple Foods
Growth Rate	15%	20%	10%	20%	8%	27%	85%
Key Segments	Value added milk products like butter, ghee, cheese	Raw fruits & vegetables, fruit pulp, Canned fruits and pickles	Cattle, buffalo and poultry	Marine fisheries and frozen products	Noodles and vermicelli	Fruit based drinks and carbonated drinks	Sugar, wheat, flour and salt
Extent of Processing	37%	2%	1%	12%	-	-	-
Share of Organized Sector	15%	48%	5%	-	80%	77%	50%

1.3 Fruit and Vegetable Market and Opportunities:

India produces the widest range of fruits and vegetables in the world. It is the second largest vegetable and third largest fruit producer accounting for 8.4 per cent of the

world's food and vegetable production. The share of organised sector in fruit processing is estimated to be nearly 48 per cent.

Fruit production in India registered a growth of 3.9 per cent during the period 2000-05 whereas the fruit processing sector grew several times faster at 20 per cent over the same period. The total area under fruit cultivation is estimated at 4.18 million hectares. The total area under vegetable cultivation is estimated at 7.59 million hectares. However less than 2 per cent of the total vegetables produced in the country are commercially processed, as compared to nearly 70 per cent in Brazil and 65 per cent in USA. India's installed capacity for fruits and vegetable processing nearly doubled during the 1990s, from 1.1 million tonnes in 1993 to 2.33 million tonnes in 2004. About 20 per cent of processed fruits and vegetables are exported. Major products exported include fruit pulps, pickles, chutneys, canned foods, concentrated pulps and juices and vegetables. Fruit exports have registered a growth of 16 per cent in volume and 25 per cent in value terms in 2005-06. Mango and mango based products alone constitute 50 per cent of the exports.

1.4 KEY STRENGHS OF THE INDUSTRY:

Some of the key success factors are discussed below.

1.4.1 Favourable Factor Conditions:

India has access to several natural resources that provides it a competitive advantage in the food processing sector. Due to its diverse agro-climatic conditions, it has a wide ranging and large raw material base suitable for food processing industries.

1.4.2 Related and Supporting Industries:

The Indian food processing industry has significant support from the well developed R&D and technical capabilities of Indian firms. India has a large number of research institutions like Central Food Technological Research Institute, Central Institute of Fisheries Technology, National Dairy Research Institute, National Research and Development Centre etc. to support the technology and development in the food processing sector in India.

1.4.3 Government **Regulations and Support:**

The Government of India has taken several initiatives to develop the food processing industry in India. One indication of the importance that the sector receives is the hiking of the present outlay for the sector from US$ 19.5 million in 2004-05 to US$ 41.35 million the next year, more than twice the earlier amount. The government has been developing agri-zones and the concept of mega food parks to promote food processing industry in India. It is considering investing US$ 22.97 million in at least 10 mega food parks in the country besides working towards offering 100 per cent foreign direct investment and income tax benefits in the sector.

In order to promote investment in the food processing sector, several policy initiatives have been taken during recent years. The national policy aims to increase the level of food processing from 2 per cent to 10 per cent in 2010 and to 25 per cent in 2025. Some of the initiatives include:

- The level of institutional credit to be provided by banks and FIs has been increased from US$ 17.41 billion during 2003-04 to about US$ 23.76 billion in 2005-06.
- Allowing full repatriation of profits and capital.
- Automatic approvals for foreign investment up to 100 per cent, except in few cases, and also technology transfer.
- Zero duty import of capital goods and raw material for 100 per cent export-oriented units. Customs duty on packaging machines reduced. Central excise duty on meat, poultry and fish reduced to 8 per cent.
- Income tax rebate allowed (100 per cent of profits for 5 years and 25 per cent of profits for the next 5 years) for new industries in fruits and vegetables besides institutional and credit support.
- Allowing sales up to 50 per cent in domestic tariff area for agro-based, 100 per cent export oriented units.
- Government grants given for setting up common facilities in Agro Food Park.

- Full duty exemption on all imports for units in export processing zones. The liberalised overall policy regime, with specific incentives for high priority food processing sector, provides a very conducive environment for investments and exports in the sector.

1.4.4 Integrated Supply Chain and Scale of Operations:

While India ranks second in production of fruits & vegetables, nearly 20 to 25 per cent of this production is lost in spoilage in various stages of harvesting. The key issues are poor quality of seeds, planting material and lack of technology in improving yield. Ensuring good quality produce entails investments in technology and ability to sustain a long gestation period for the harvest. Good quality production also results in better quality of processed fruits. Hence there is a need to establish backward linkages with the farmers with the help of arrangements such as contract farming to improve the quality of the produce. Scale is a key factor in the processing industry. Nearly 90 per cent of the food processing units are small in scale and hence are unable to exploit the advantages of economies of scale. This is also true with land holdings. The country has only 3600 slaughterhouses, 9 modern abattoirs and 171 meat processing units, and a limited number of pork-processing units. This is one of the reasons penetration of processed meat is extremely poor at 1 per cent in India. These figures indicate both the need for scale, and the potential for growth offered by the sector.

1.4.5 Processing Technology:

Most of the processing in India is currently manual. There is limited use of technology like pre-cooling facilities for vegetables, controlled atmospheric storage and irradiation facilities. This technology is important for extended storage of fruits and vegetables in making them conducive for further processing. In the case of meat processing, despite the presence of over 3600 licensed slaughter-houses in India, the level of technology used in most of them is limited, resulting in low exploitation of animal population. Bringing in modern technology is an area that existing as well as new investors in the sector can focus on, this will make a clear difference in both process efficiencies as well as quality of the end product.

1.4.6 Increasing Penetration in Domestic Market:

Most of the processing units are export oriented and hence their penetration levels in the domestic market are low.

For example,

- Penetration of processed fruits and vegetables overall is at 10 per cent.
- The relative share of branded milk products especially ghee is still low at 2 %.
- Penetration of culinary products is still 13.3 per cent and is largely tilted towards metros.
- Consumption of packaged biscuits for Indian consumers is still low at 0.48 per cent while that for Americans is 4 per cent. However, there is increasing acceptance of these products amongst the urban population. India has a large untapped customer base and even a small footprint in the domestic market would enable the player to gain significant volumes.

1.4.7 Brand Competitiveness:

Share of branded products in purchases of Indian consumers has increased by 25 per cent to 35 per cent. This is especially true for urban consumers. Branded products like Basmati rice and KFC's chicken have been very successful implying that there is a good demand for hygienic branded products at reasonable prices.

1.4.8 Product Innovation:

Certain processed food categories such as snack foods are impulse purchase products where consumers look for novelty and new flavours and hence these categories lack brand loyalties. Visibility through attractive packaging boosts consumption. Increasing time constraints amongst the working middle class has boosted consumption of products like instant soups, noodles and ready-to-make products. Innovation in packaging and product usage is an important success factor for processed foods.

COMPANY PROFILE

CHAPTER-II

COMPANY PROFILE

2.1 Company Profile

JISL journey began in 1887 when company's forefathers left the deserts of Rajasthan, their home state, in search of water and food and reached Wakod, at the foothills of the famous Ajanta Caves. They started farming as a means of livelihood.

In 1963 selling kerosene in pushcart, the young law graduate, Bhavarlal Jain, founded the family business in trading. The family partnership with a meager Rs. 7,000 accumulated savings of three generations, as capital. Soon, agencies for two wheelers, auto vehicles and automobile accessories were established in quick succession.

Story of Success

Trading

Inspired by a quote, "Agriculture: a profession with future" young Jain added dealership of tractors, sprinkler systems, PVC pipes and other farm equipment. In order to broad base the agri-business, agencies for farm inputs such as Fertilizers, Seeds, Pesticides were also added. Sales grew from Rs. 1 million in 1963 to Rs. 110 millions in 1978, a phenomenal increase of 110 times. These formative years helped us build a unique and lasting enterprise. This was achieved through consistent high standards of performance and personal behavior on the one hand and a strong sense of commitment for meeting targeted volumes and for payment of debts in time, on the other. Dealings with national and international principals were a contributing factor towards building these attitudes. In time, JISL came to be recognized as a reputable, trustworthy and prestigious house. This background augured well for an entry into industrial ventures.

2.2Refined Papain:

JISL took over a 14 year-old sick Banana Powder Plant in April 1978 at a high auction price of Rs. 3 million while JISL only had Rs. 0.2 million as inevitable surpluses. The plant was quickly modified for the production of Papain from Papaya latex. In December 1978, the founder traveled to New York in search of customers for Jain Papain. The competition for purchase of raw materials at home and for sale of Papain abroad was stiff and stifling. However, we developed purified Papain through ceaseless in-house R&D and emerged as the `Number One' supplier of the highest purity refined Papain. Thus, Papain put us on the international map.

2.2.1PVC Pipes

In 1980, manufacturing of PVC Pipes commenced with a small annual capacity of 300 MT's which was increased to over 35,600 MT's per annum by 1997, making company the largest single producer of PVC Pipes in the country. A close-knit dealer distribution network in the rural areas coupled with continuous automation and up gradation of product facilities and in-house R&D for maximum capacity utilization

has kept company at the forefront. This further helped company to expand the range to Casing & Screen Piping Systems thereby continuing to contribute to the growing export volumes.

2.2.2Micro Irrigation Systems:

Beginning in 1989, JISL toiled and struggled to pioneer Water-management through Micro Irrigation in India. Company has successfully introduced some hi-tech. concepts to Indian agriculture such as 'Integrated System Approach', One-Stop-Shop for Farmer, and `Infrastructure Status to Micro Irrigation & Farm as Industry'. JISL have come a long way.

2.2.3Food Processing:

In 1994 JISL set-up world class food processing facilities for dehydration of onion, vegetable and production of fruit purees, concentrates and pulp. These plants are ISO 9001 & HACCP certified and Meet International FDA statute requirements. Combining the modern technologies of the west with the vast, mostly untapped agriculture resources of India, using the local human resources and inculcating the culture of excellence in quality and total customer service. JISL have set them selves a goal 'to become a major and reliable global supplier of food ingredients of finest quality.'

2.3 About Company: -

Each of JISL products is an outcome of the effort to conserve nature previous resources through substituting or value addition. This is the legacy of deliberation and conscious endeavor that stone from deep-rooted concern for the nature, the products of JISL include MIS and Cornpones, PVC and PE (HDPE, MDPE, LDPE, LLDEPE, ABC, PC etc)

Piping system modulated and excluded plastic products and plastic sheets, dehydrated onion and vegetables, processed fruits, tissue culture plants, green houses, liquid and water-soluble fertilizer, bio-pesticide, bio-fertilizer and solar water heating system. 'JISL' Indians only one Hi-tech integrated Agricultural shop.

2.3.1Corporate Philosophy

Mission

Leave this world better than you found it.

Vision

Establish leadership in whatever we do at home and abroad.

Credo

Serve and strive through strain and stress;

Do our noblest, that's success.

Goal :

Achieve continued growth through sustained innovation for total customer satisfaction and fair return to all other stakeholders. Meet this objective by producing quality products at optimum cost and marketing them at reasonable prices.

Guiding Principle

Toil and sweat to manage our resources of men, material and money in an integrated, efficient and economic manner. Earn profit, keeping in view commitment to social responsibility and environmental concerns.

Quality Perspective

Make quality a way of life.

Work Culture

Experience: 'Work is life, life is work'.

2.3.2Quality Policy

The company's quality edifice stands on the following Pillars:

1. Total commitment for customer satisfaction.
2. Protection and Advancement of Environment.
3. Market Leadership.
4. Strive for Quality Excellence.
5. Sustainable Development of Stakeholders.

Our commitment to quality is unflinching, our hunger for growth is deep-rooted and our capacity for details is amazing. Over the decades, we have demonstrated a rare resilience and fortitude. The Group is determined to improve productivity and focus continuously on innovation and up-gradation of its products and people.

2.3.3Environment Policy

Why Environment is so important?

Development of mankind impacts and, in turn, is impacted by the Environment. Both are not only inter-related but are also inter-dependent.

What will we do to protect and advance it?

We will neither advocate maintaining status-quo nor encouraging exploitation of natural resources for short term economic objectives. Instead, through sound and sustainable practices, we shall establish a creative partnership between development and environment. Increase in green cover, conservation of scarce resources, control of pollution, promotion of economic progress are important guiding lights we will follow for nurturing such a relationship.

How will we protect and advance it?

We will fulfill this policy by committing ourselves to continuous improvement, updation of our processes, products and facilities, on one hand, and through spreading awareness, education and training of our associates, on the other.

2.4 Board of Director: -

Bhavarlal Jain	Chairman
Ashok Jain	Vice Chairman
Anil Jain	Managing Director
Ajit Jain	Joint Managing Director
Anirudha Barwe	Non Executive Director
Vasant Warty	Non Executive Director
Ramesh Jain	Non Executive Director
Radhika Pereira	Non Executive Director
Atul Jain	Director – Marketing
Rajnikant Jain	Director – Technical (Food Park)
R. Swaminathan	Director – Technical (Plastic Park)

2.5Awards

- Crawford Reid Memorial Award – Irrigation Association USA.
- Vasantrao Naik Krishi Sanshodhan & Gramin Vikas Pratishthan Award.
- Relience Trophy.
- Nalla VazaiAward - GOI
- Trade Award – Govt of ISRAEL.
- DSIR National Award – GOI
- FIE Foundation Award
- National Export Award – GOI
- Confederation of Export Unit Trophy
- Plex Council Award – GOI
- Honorary Membership of Indian Institution of Industrial Engineering
- Certificate of Merit – GOI
- Certificate of Export Recognition – GOM

2.6 Brands:

2.7Product profile:-

High Tech Agricultural Input Products:

Division mainly consists of:

- Surface, subsurface and overhead irrigation products popularly known as Drip irrigation/ micro-irrigation and Sprinkler irrigation system.
- PVC pipes used in irrigation
- Bio-Tech, Tissue culture plant materials and other agriculture inputs.
- Bio fertilizers.
- Process food such as Fruit processing, Onion and Vegetable Dehydration.
- Solar water heating systems.
- Green houses.
- Liquid and water-soluble fertilizer.

NEEDS OF THE STUDY AND ITS BACKGROUND

CHAPTER-III

NEED OF THE STUDY AND ITS BACKGROUND

India is one of the key food producers in the world, with the second largest arable land area. It is the largest producer of milk, pulses, sugarcane and tea in the world and the second largest producer of wheat, rice, fruits and vegetables. India's Food Processing industry is one of the largest industries in the country, it is ranked fifth in terms of production, consumption, export and expected growth.

The Indian food industry is estimated to be worth over US$ 200 billion and is expected to grow to US$ 310 billion by 2015. India is one of the world's major food producers but accounts for only 1.7 per cent (valued at US$ 7.5 billion) of world trade in this sector – this share is slated to increase to 3 per cent (US$ 20 billion) by 2015. The Indian food processing industry is estimated at US$ 70 billion. It contributed 6.3 per cent to India's GDP in 2003 and had a share of 6 per cent in the total industrial production. The industry employs 1.6 million workers directly.

The food processing industry is presently growing at 14 per cent against 6-7 per cent growth in 2003-04. The industry received foreign direct investments totalling US$ 143.80 million in 2007-08 against US$ 5.70 million in the previous fiscal. The cumulative FDI received by the industry from April 2000-January 2009 stood at US$ 760.32 million

The increased interest in SCM has also been spurred by developments in Information and Communication Technology (ICT) that enable frequent exchange of huge amounts of information among chain participants, for purposes of coordination. Consequently, there is a need and an opportunity for a joint approach of business partners towards the establishment of more effective and efficient supply chains. This is especially true in agrifood supply chains, because of shelf-life constraints of food and agricultural products and increased consumer attention to safe and environment/animal-friendly production methods.

Agrifood chains and networks play an important role in providing access to markets for producers from developing countries, as well as for local, regionaland export markets. Changes in agrifood systems impact the ability of agro-industrial enterprises to compete; small and large alike will have to innovate and reduce costs, while being more responsive to consumer needs. This is where SCM can help. This paper introduces the concept of SCM and illustrates its applications in agro industries, with a focus on developing countries. It presents an overview of the background and theory of SCM, drawing particularly from management thinking related to industrial supply chains that produce, trade and distribute merchandise. It also discusses current practices of SCM. The paper starts with an overview of SCM in the western world and then focuses on the specific characteristics of the developing world and on what can be learned. The paper will discuss a number of cases in order to make the lessons learned understandable and applicable to the reader's particular situation. The paper will also explore the concept of a 'supply chain', discuss its potential performance constraints and suggest improved approaches.

The global agrifood system

A number of recent trends that include globalization, urbanization and agro-industrialization, are placing increasing demands on the organization of agrifood chains and networks. Food and agribusiness supply chains and networks – which tended to be primarily characterized by autonomy and independence of actors – are now rapidly moving towards globally interconnected systems with a large variety of complex relationships. This is also affecting the ways in which food is produced, processed and delivered to the market. Perishable food products can nowadays be shipped from halfway around the world at fairly competitive prices. Demand and supply are no longer restricted to nations or regions, but have become international processes.

The market exerts a dual pressure on agrifood chains, forcing improved coordination among buyers and sellers and continuous innovation. The latter encompasses the development and implementation of enhanced quality, logistics and information systems. Companies have to satisfy the increasing demands of consumers

worldwide, Non-Governmental Organizations and other actors in the agrifood chains, and must react to changing government regulations. In the western world, companies nowadays have to obtain a 'license to produce and deliver', that is, society has to accept the way they produce and deliver their goods. If this is done by using questionable methods, for example child labor, environmental pollution, etc, their products will not be accepted. In a global agrifood system, companies have to work continuously on innovations in products, processes and forms of cooperation.

OBJECTIVE AND ITS SCOPE

CHAPTER-IV

OBJECTIVES AND SCOPE

4.1 Objectives

One of the major objective of supply chain management is to reduce the total amount of resources necessary to provide the required level of customer service to a particular customer group .some of other objective of supply chain management are to:

1) To study the onion dehydration process for export quality.

2) To evaluate performance of onion dehydration products.

3) To study the quality control and food safety according to products parameter.

4) To study different marketing channel for onion dehydration products.

5) To study the awareness of farmers about contract farming.

4.2 SCOPE:

Onions are perishable in nature due to high initial moisture content (about 82 percent). Presently, about 35-40 % of the onion produced is estimated to be lost in various post harvest operations in India. The quality of onions *i.e.* appearance, colour, flavour and texture, deteriorates due to spoilage by organisms, enzymes, vinegar flies *etc.* during storage; and oxygen to degrade the harvested onions. The production of onions is seasonal whereas its demand prevails throughout the year. As a consequence, there is a glut or scarcity of onions in the market. Consequently, the price of raw onion varies usually from Rs. 1.0 to Rs. 30.0 per kg, an undesirable situation to both grower as well as consumer. In order to overcome

these losses, the dehydration of onion is to be adopted largely as one of the major processing operations which reduces the volume and there by transportation cost; and increases the shelf life.

India produces the widest range of fruits and vegetables in the world. It is the second largest vegetable and third largest fruit producer accounting for 8.4 per cent of the world's food and vegetable production. The share of organized sector in fruit processing is estimated to be nearly 48 per cent.

Fruit production in India registered a growth of 3.9 per cent during the period 2000-05 whereas the fruit processing sector grew several times faster at 20 per cent over the same period. The total area under fruit cultivation is estimated at 4.18 million hectares. The total area under vegetable cultivation is estimated at 7.59 million hectares. However less than 2 per cent of the total vegetables produced in the country are commercially processed, as compared to nearly 70 per cent in Brazil and 65 per cent in USA. India's installed capacity for fruits and vegetable processing nearly doubled during the 1990s, from 1.1 million tonnes in 1993 to 2.33 million tonnes in 2004. About 20 per cent of processed fruits and vegetables are exported. Major products exported include fruit pulps, pickles, chutneys, canned foods, concentrated pulps and juices and vegetables.

RESEARCH METHODOLOGY

CHAPTER-VI

RESEARCH METHODOLGY

The needed information regarding various aspects of supply chain dehydrated product such as process, distribution channel procurements. As mentioned earlier the research was aimed at using variables having a wider scope in ascertaining the quality. Hence the research primarily focuses on obtaining information from the respondents relating to their preference for a dehydrated unit, their knowledge of the association, service quality, and farmers.

The research uses a descriptive and conclusive research design. A conclusive research design has been used because the objective of the research was to test the hypothesis related to distribution and the information requirement was specific dehydrated product. The research process is formal, structured, and quantitative although the attitude measurement was qualitative. The samples were collected each farmer survey. Since the samples were quite representative of the population and the analysis of data had to be done in quantitative approach, conclusive research is the best fit.

Multiple cross-sectional designs include four samples drawn in lots of 30 from the population and also information from each sample has been drawn only once. Multiple cross-sectional designs have been used as analysis of the data is not needed on individual respondent level but at the aggregate level

Data collection from secondary sources

This research work hasn't used secondary data as the existing data compares onion dehydration based on parity and disparity amongst them whereas we intend to measure the brand quality based on a variety of variables.

Data collection from primary sources

The data has being collected from farmer survey random selection. A sample of The tool for primary data collection is random selection. The respondents are introduced to the study through a brief on the subject. A total of respondents are analysis through the company stranded. The data obtained is tabulated in table titled consolidated data tabulation using the data coding as mentioned in Table titled Data coding table in the appendix.

Scaling techniques

The research needs a quantitative measure of attitude of respondents towards the farmer. A brand does not have an absolute value and is vague if it isn't a comparative value. So the attitude measurement has to be done by comparing each variable of the brand in comparison with the array of competing brands. Hence we have used Rank Order Scaling from the comparative scaling techniques. Paired comparison hasn't being used because it would be cumbersome to form pairs amongst the nine selected for study. Using the rank order scaling each variable of the brand component is assigned a rank which is then converted into rated points using a mathematical algorithm.

IMPORTANCE OF MARKETING RESEARCH.

Marketing Research can help managers in several ways. It improves the quality of decision-making and help managers better understand the market place. Most important, sound marketing research alerts managers to market place trends early than react to situations that have already occurred.

OVERCOMING BARRIERS TO THE USE OF MARKETING RESEARCH.

- ✓ A narrow conception of marketing research.
- ✓ Uneven caliber of marketing researchers.
- ✓ Late and occasionally erroneous findings by marketing research.
- ✓ Personality and presentational differences

DATA PRESENTATION & ANALYSIS

CHAPTER-VII

DATA PRESENTATION AND ANALYSIS

6.1 CONTRACT FARMING:

Data on contract farming are presented in table 6.1.1 This revealed that 70 per cent farmers were aware of contract farming and are contract farmers of onion under Jain Irrigation.

Table 6.1.1 Farmers awareness about onion contract farming:

Farmers response	Yes	No	Total farmers
No of farmers	56	04	60
Share %	93.33	06.66	100

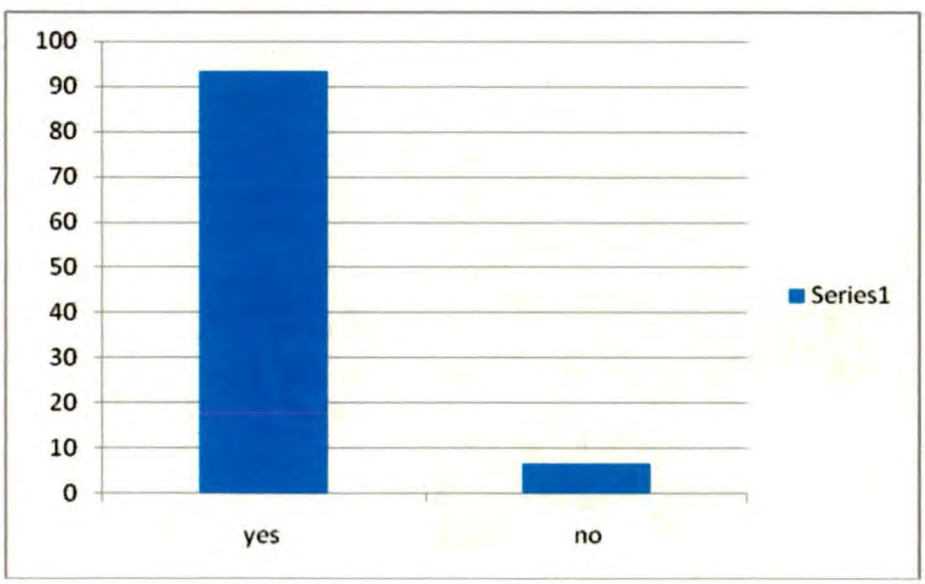


Fig . 6.1.1 Awareness regarding contract farming

As per data collected I have found that about 56 farmers (i.e. 93.33%) are aware about contract farming and 4 farmers(i.e. 06.66%) are not aware about contract farming.

Table 6.1.2 Performance of V-12 variety under Jain irrigation

Farmers response	Yes	No	Total farmers
No of farmers	53	07	60
Share %	88.3333	11.6666	100

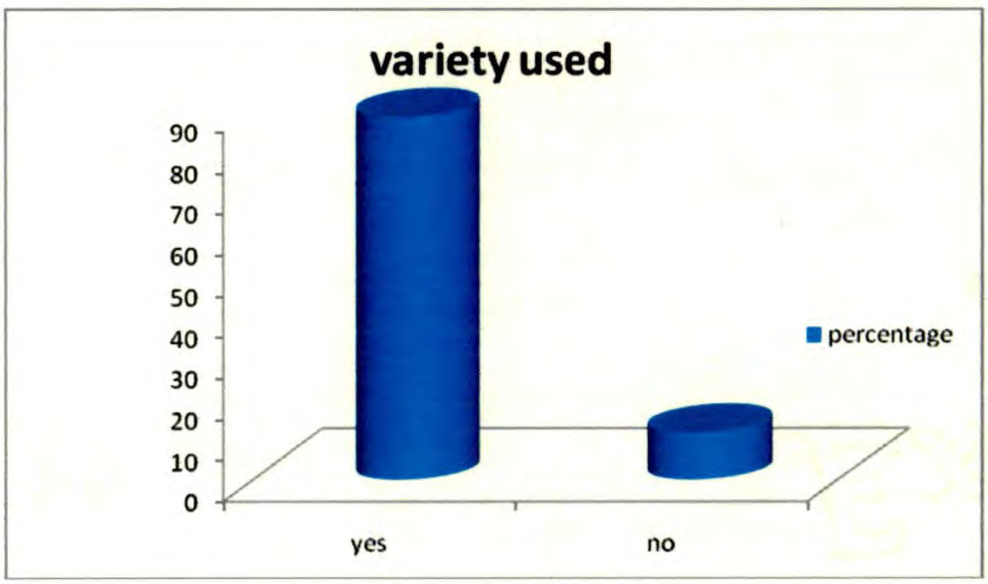


Fig. 6.1.2 Performance of V-12 variety under Jain irrigation

As per data collected I have found that about 53 farmers (i.e.33.33%) are aware about performance of V-12 variety and 7 farmers (i.e. 11.66%) are not aware about V-12 variety of Jain irrigation for cultivation.

Table 6.1.3 Awareness of normal TSS required for onion dehydrated

Farmers response	Yes	No	Total farmers
No of farmers	34	26	60
Share %	56.6666	43.3333	

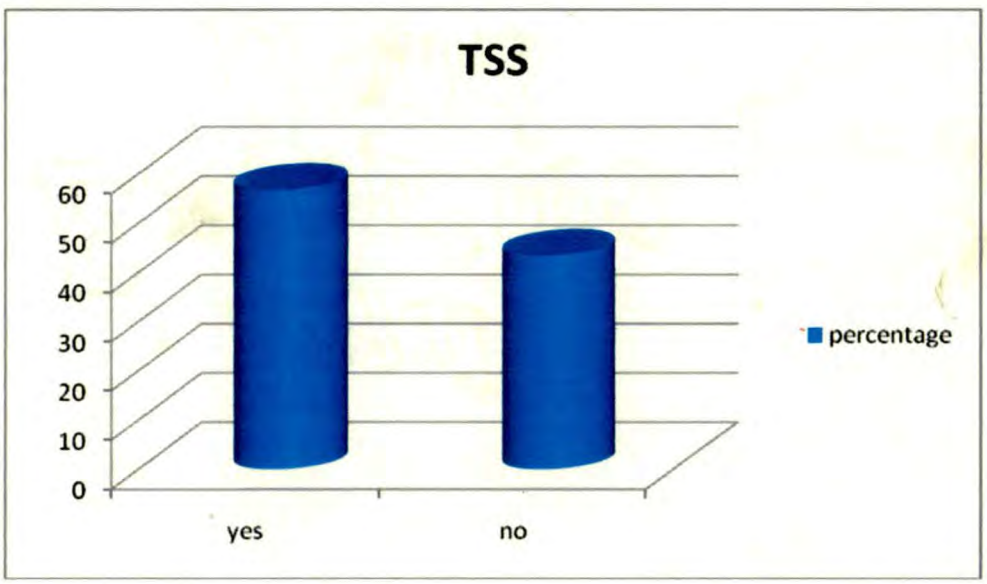


Fig. 6.1.3 Awareness of normal TSS required for onion dehydrated

As per data collected I have found that about 34 farmers (i.e. 56.66%) are aware about TSS required for onion dehydration and 26 farmers (i.e. 43.33%) are not aware about TSS required for onion dehydration.s

Table 6.1.4 Irrigation method farmers normally follow

Farmers response	Drip	Sprinkler	Flood	Total farmers
No of farmers	13	16	31	60
Share %	21.66667	26.66667	51.66667	

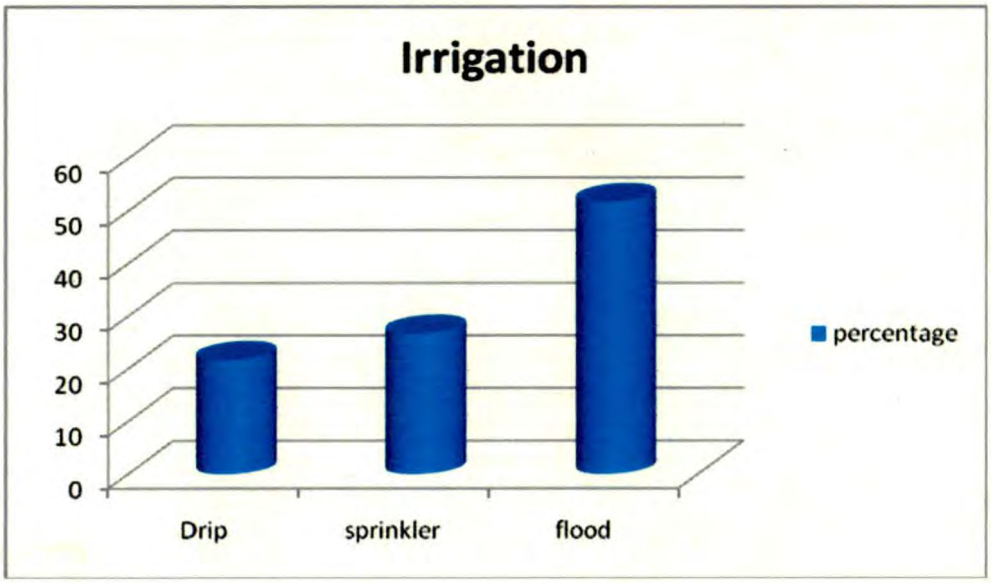


Fig 6.1.4 Irrigation method farmers normally follow

As per data collected I have found that about 13 farmers (i.e.21.66%) adopt drip irrigation,16 farmers(i.e. 26.66 %) adopt sprinkler irrigation & 31 farmers (51.66 %) adopt flood irrigation system.

Table 6.1.5 Size of land holding

Area	<2 ha	2-5ha	5-10ha	Total farmers
No of farmers	12	37	11	60
Share %	20	61.66667	18.3333	

Fig 6.1.5 Size of land holding

As per data collected I have found that about 12 farmers (i.e.20 %)having <2 ha land holding capacity,37 farmers(i.e. 61.66%) having 2-5 ha land holding capacity & 11 farmers (11.33%) having 5-10 ha land holding capacity.

Table 6.1.6 Normally onion price getting from the market to farmers

Onion price	Rs 300-400	Rs 400-500	Rs >500	Total farmers
No of farmers	9	23	28	60
Share %	15	38.3333	46.66667	

Fig 6.1.6 Normally onion price getting from the market to farmers

As per data collected I have found that about 9 farmers (i.e.15 %) getting Rs 300-400 onion price from the market ,23 farmers(i.e. 38.33%) getting Rs 400-500 onion price from the market & 18 farmers (46.66%) getting Rs >500 onion price from the market.

Table6.1.7 Farmers aware about curing after harvesting

Farmers response	Yes	No	Total
No of farmers	41	19	60
Share %	68.3333	31.66667	

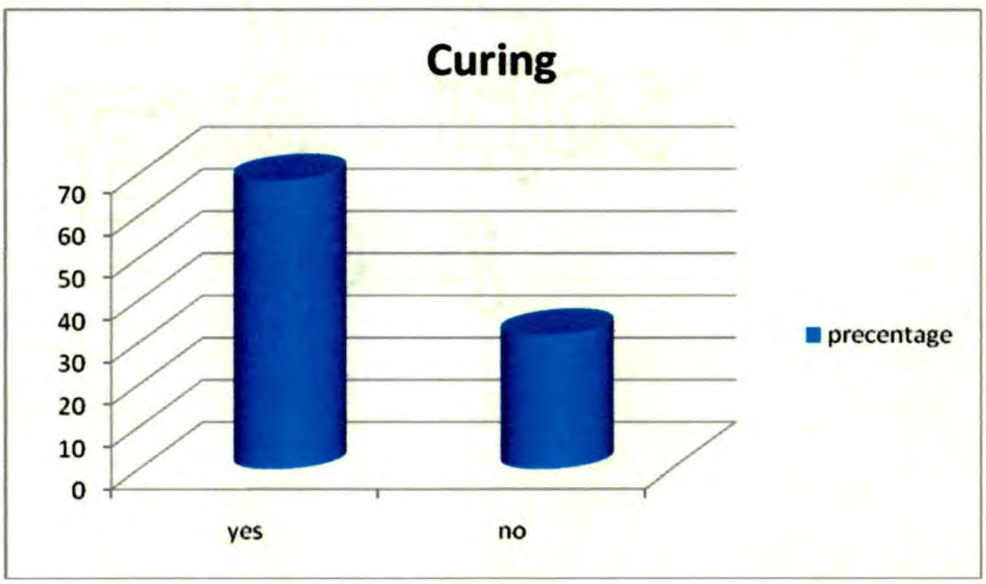


Fig 6.1.7 Farmers aware about curing after harvesting

As per data collected I have found that about 41 farmers (i.e. 68.33%) are aware about curing after harvesting,19 farmers (31.66%) are not aware about curing after harvesting.

Table 6.1.8 whether farmers are following fertilization

Farmers response	Yes	No	Total farmers
No of farmers	37	23	60
Share %	61.66667	38.3333	

Fig 6.1.8 whether farmers are following fertilization

As per data collected I have found that about 37 farmers (i.e. 61.66%) are following fertilization,23 farmers (38.66%) are not following fertilization .

Table 6.1.9 Farmers aware about onion quality

Farmers response	Yes	No	Total farmers
No of farmers	43	17	60
Share %	71.66667	28.6666	

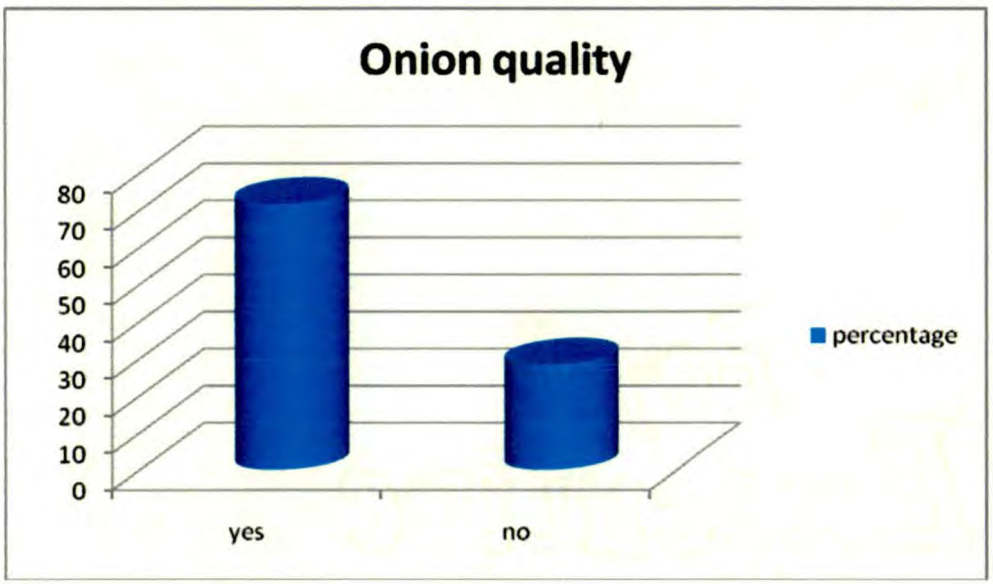


Fig 6.1.9 Farmers aware about onion quality

As per data collected I have found that about 43 farmers (i.e. 71.66%) are aware about onion quality,17 farmers (28.66%) are not aware about onion quality.

Table 6.1.10 Does Farmers have storage facilities

Farmers response	Yes	No	Total farmers
No of farmers	34	26	60
Share %	56.66667	43.3333	

Fig 6.1.10 Does Farmers have storage facilities

As per data collected I have found that about 34 farmers (i.e. 56.66%) have storage facilities,26 farmers (43.33%) does not have storage facilities.

6.2 ONION DEHYDRATION

6.2.1GENERAL DESCRIPTION

All onions for processing are grown from specific varieties best suited for dehydration. Specific strains of the Creole Onion, Southport Globe Onion, and the Hybrid Southport Globe were developed by the dehydration industry. They are white in color and process a higher solid content which yields a more flavorful and pungent onion.

Onion dehydration involves the use of a continuous operation, belt conveyor using fairly low temperature hot air from 38 - 104oC. The heat originally was generated from steam coils, but now natural gas is more popular. Typical processing plants will handle 4500 kg of raw product per hour(single line), reducing the moisture from around 83 percent to 4 percent (680 - 820 kg finished product). These plants produce 2.25 million kg of dry product per year using from 35 - 46 MJ/dry kg produced (+14 MJ/kg of electrical energy), or 9.3 MJ/kg of water evaporated.

An example of one type of processing equipment, the Proctor dehydrator, is a single-line unit 64.5 x 3.8 m wide, requiring 2450 m3 of air per minute and up to 42 million kJ per hour. Due to the moisture removal, the air can, in some cases, only be used once, and thus, is exhausted. Special silica gel–Bryair, desiccations units are required in the final stage. Approximately $200,000 in fuel are, thus, used in a single-line dryer in a year's operation.

6.2.2PROCESSING STEPS

Onion dehydration using a continuous conveyor dryer involves the following basic steps:

a) Harvesting,

b) Transporting to the plant,

c) Curing,

d) Washing,

e) Slicing,

f) Dehydration in three to four stages,

g) Milling, and

h) Packaging.

Each of these steps is discussed in detail for a Proctor (Proctor and Schwartz, Inc. of Horsham, PA) dehydrator.

A diagram of a typical dryer is shown in Fig. 4.2.1

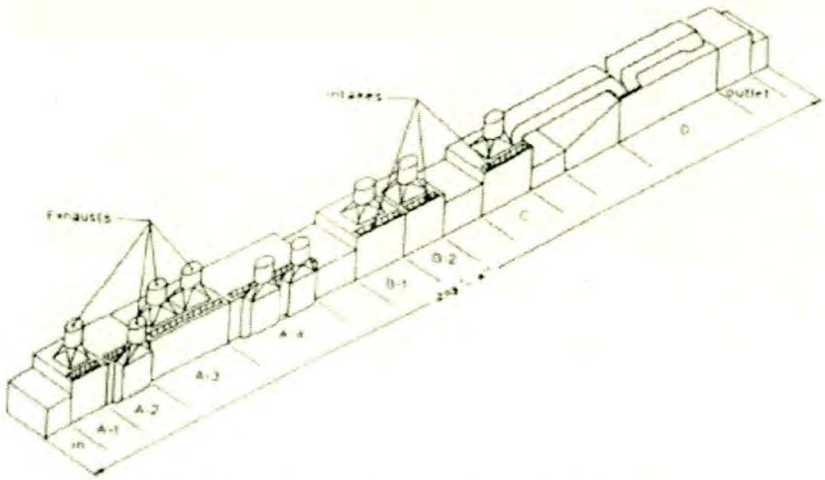


Figure 1. Single-line onion dehydrator.

Figure 6.2.1 Single-line onion dehydrator.

Harvesting is accomplished mechanically by specialized equipment that is designed and fabricated by the processing industry. Harvesting is accomplished by a small crew of 20 to 30 people used to inspect the onions and to operate the equipment. The onions are topped, dug, inspected, and loaded into bulk trucks holding .

The trucks loaded with onions are taken directly to the plant. They are loaded into large curing bins, where excess moisture is removed by passing large volumes of heated air (38oC) through the onions. Curing conditions the onions so that peeling and processing can be accomplished successfully.

After curing for 48 to 72 hours, the onions are passed into the processing line. The earlier method of scooping up the onions with a tractor has been replaced with an automatic conveyor system that gently carries them to the preparation line. Machines automatically remove any tops that may remain attached to the onions. They are then inspected, washed in a high-pressure washer, soaked in a stainless steel tank to remove sediment, washed again in a high-pressure washer, and re-soaked in a bath of highly chlorinated water in order to reduce bacteria to the lowest possible level.

The onions are then re-inspected and placed in stainless steel surge tanks. Two large stainless steel tanks are used so that one can be washed as the other is being used. The onions are fed out of the surge tanks into the slicers. Razor-sharp rotating knives cut the onions into uniform slices, which are then passed to the dryer. From the slicers, a continuous and uniform flow of onions is conveyed to the wiper feed that carries the sliced product laterally across the open-feed end extension. Here, the onions are carefully transferred to the dryer conveyor for the first stage of drying. This is the most critical stage; where, under high-volume air flow conditions and with moderately high temperatures, the bulk of the water is rapidly removed from the onion. The moisture content of the onion is reduced from an initial 83 percent to 25 percent. This is called the "A" stage; where, onion loading depth is approximately 10 cm. Absolute uniformity and controlled depth of loading on the dryers is necessary to prevent "pinking," an enzymatic discoloration that can take place in the onion slice if proper drying conditions are not maintained. The pure white color of the discharged product from this drying stage is a test of the high quality of the product. Normal drying temperature for stage "A" is around 104oC; however, temperatures as low as 82oC can be used. The lower the temperature will increase the processing time; however, the quality will be improved. High-powered blowers and exhaust fans move the air over natural gas burners and through the beds of onions on the dryer conveyor, to evaporate the necessary tons of water removed from the product each hour. Close air volume and pressure control must be maintained in all parts of this drying stage as the air moves up and down through the bed to obtain product drying uniformity. Automatic temperature controllers and a long list of safety devices control the continuous operation. At the proper point in the drying process, the onions are automatically transferred to the second stage ("B" stage) of drying; where, under reduced temperature conditions and deeper bed loadings (approximately 30 cm), the difficult to remove diffused water is slowly withdrawn. Here, moisture content is reduced 10 percent. At the special transfer zone, the onions are gently handled by rotary devices that assure full removal from the first-stage dryer and separation removal of clumps for uniform second-stage loading.

The second stage of drying transfers to the third stage ("C" stage) with even deeper loading (approximately 75 to 100 cm deep), as the deeply diffused water becomes even more difficult to remove. Moderating temperatures and air flows are used to maintain close product temperature control as a steady evaporation of water is reduced from each onion slice and the evaporative cooling effect can no longer be counted on to maintain the low product temperature required for maximum product quality. After leaving the "C" stage, moisture content is down to 6 percent. A special unloaded takes the now nearly dry onions off the third-stage conveyor, transferring them to the elevating conveyer for the fourth and final stage of dehydration (if necessary). Here, conveyor loading depths up to 1.8 m are used for final moisture reduction and equilibration. Dehumidified air from a two-stage desiccation unit is counter-flowed through this deep layer to bring the finished onions to the point (about 4 percent moisture) where milling can best be accomplished and shelf life maintained. After drying, the onions are passed over a long stainless steel vibrating conveyor that gently carries them to the milling area.

In the mill, skin is removed by aspirators from the onion pieces. The onions are then milled into sliced, large chopped, chopped, ground, granulated and powdered onions.

6.2.3POWER PRODUCTION AND ENERGY REQUIREMENTS

The energy requirements for the operation of a dryer will vary due to differences in outside temperature, dryer loading, and requirement for the final moisture content of the product. A single line Proctor dryer handling 4500 kg of raw product per hour (680 - 820 kg finished) will require about 530 GJ/day, or for an average season of 150 to 180 days, 80 to 95 TJ using approximately 35 MJ/kg of dry products. This is estimated to cost 11 cents per kg of finished product. The energy is provided by natural gas or geothermal fluid; air is passed directly through the gas flame or geothermal heat exchanger in stages A and B, and over steam coils in stages C and D. The steam coils are necessary to prevent turning of the onions in the last two

stages. In addition to the heating requirements, electrical energy is need for the draft and re-circulation fans, and small amounts for controls and driving the bed motors. Total electric power required for motor is from 500 to 600 horsepower (370-450 kW), or about 1 x 104 kWh/day, or 2 x 106 kWh/season. This amounts to 2.30 MJ/kg of finished product and increases to about 14 MJ/kg when all electrical requirements are considered.

In general, four stages (A through D) are preferred; however, if the ambient air humidity is below about 10 percent, stage D can be eliminated. Also temperature and number of compartments in each stage may vary. Stage D, supplying desiccated air with a Bryair unit, reduces the moisture content of the product to a point below that of the ambient air. The unit is divided into two sides: the process side, which supplies desiccated air to the dryer after it has been passed through silica gel beds; and the reactor side in which heated air is passed over the silica gel beds in order to remove the moisture which had been absorbed in the process side. The process air is drawn in from the outside under ambient conditions of temperature and humidity, passed through a filter and a cooling coil, and then is circulated through a dry silica gel bed where some of the moisture is absorbed. The process air then is drawn out by a fan and directed to the D2 stage of the dryer. This process air leaves the Bryair unit at a temperature of about 49oC with a moisture content of about 4 g per kg. On the reactor side, ambient air is drawn into the intake and passed over a gas burner which heats the air to about 121^{oC}, after which the air is circulated through the silica gel beds so that the moisture which had been absorbed in the process side is removed. A suction fan on the discharge side then exhausts the moisture-laden reactor air to the atmosphere at temperatures of from 66 - 107^{oC}. A slight pressure differential is maintained between the process and reactor sides so that air is prevented from leaking to the process side from the reactor side. A specific example of a Proctor dehydration is detailed in Table

1. The total energy requirements, using natural gas as a fuel, vary from 22 - 27 x GJ/hr depending upon the ambient air varying from 18 - 4^{oC}. Air flows depend upon temperature and amount or recalculated air–which could only be estimated.

6.3 Standard Dehydrated White Onion

Standard Dehydrated White Onion - **Sliced**

Standard Dehydrated White Onion - **Large Chopped**

Standard Dehydrated White Onion - **Standard Chopped**

Standard Dehydrated White Onion - **Small Chopped**

Standard Dehydrated White Onion - **Minced**

Standard Dehydrated White Onion - **Granulated**

Standard Dehydrated White Onion - **Standard Powder**

Standard Dehydrated White Onion - **Kibbled**

Standard Dehydrated White Onion - **Special Large Chopped**

Standard Dehydrated White Onion - **6mm Diced**

Standard Dehydrated White Onion - **Ground**

6.3.1 Standard Dehydrated White Onion – Sliced

Applications :

Canned soups, salads, hamburgers, pizzas & other fast food preparations. Can be easily used in salads & other preparations.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
6.7	--	90%	ADOGA	Every Batch
1.7	--	5%		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.2 Standard Dehydrated White Onion - Larged Chopped

Applications :

Dry soup mixes, sauces, Speciality / ethnic food preparations, canned, dry or frozen vegetable mixes, dry casserole mixes, stuffing mixes, food service & fast foods.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
9.5	Tr	---	ADOGA	Every Batch
6.7	5	---		
2.36		30		
1.7		10		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.3 Standard Dehydrated White Onion - Standard Chopped

Applications :

Dry soup mixes, sauces, speciality / ethnic food preparations, canned soups, dry or frozen vegetable mixes, dry casserole mixes, stuffing mixes, food service & fast foods.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Bulk Index
6.30	Trace	---	190 - 260
4.75	2%	---	
2.36		60%	
1.7		10%	

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.4 Standard Dehydrated White Onion - Small Chopped

Applications :

Canned stewed tomatoes, green beans, peas & other vegetable & meat preparations / mixes, uniformly sized pieces suited for dispensing machine.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
6.30	Tr	---	ADOGA	Every Batch
4.75	2	---		
2.36		70		
1.70		10		

Notes :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.5 Standard Dehydrated White Onion – Minced

Applications :

Soups, sauces, canned / dry / frozen food, salad dressings, meat products, other food products wherever onion flavour & taste desired'. Ideal for repacking for retail stores.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
4.75	Tr	---	ADOGA	Every Batch
3.35	2	---		
0.85	--	3		
0.50	--	1		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.6 Standard Dehydrated White Onion - Larged Chopped

Applications :

Vegetable & meat preparations, gravies, sauces, seasonings, cheeses, crackers etc. Ideal for retail packs suitable for metering devices.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
0.60	Tr	---	ADOGA	Every Batch
0.50	5	---		
0.15	--	6		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.7 Standard Dehydrated White Onion - Standard Powder

Applications :

Suitable for varied food preparations, Wherever onion flavour & taste is desired.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
0.355	2	---	ADOGA	Every Batch
0.18	25	---		
0.15	50	---		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.8 **Standard Dehydrated White Onion – Kibbled**

Applications :

Used in varied food preparations Wherever onion flavour & taste is required & appearance & texture of onion is desired.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
11.2	5	---	ADOGA	Every Batch
3.35	--	40%		
1.18	--	10%		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.9 Standard Dehydrated White Onion - Special Larged Chopped

Applications :

Vegetable & meat preparations, gravies, sauces, seasonings, cheeses, crackers etc. Ideal for retail packs suitable for 'metering devices.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
6.70	2	---	ADOGA	Every Batch
3.35	--	70		
1.70	--	10		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.10 Standard Dehydrated White Onion - 6mm Diced

Applications :

Highly uniform particle-size makes this an ideal replacement for IQF or frozen diced onions used in varied food preparations..

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
6.70	2	---	ADOGA	Every Batch
2.36	--	10		
1.70	--	5		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.3.11 Standard Dehydrated White Onion – Ground

Applications :

Free flowing particles, used in retail packs, metering machines and varied food preparations.

Specifications :

Sieve Opening mm	Max % retained	Max % pass through	Method	Frequency
1.18	Tr	---	ADOGA	Every Batch
0.60	20	---		
0.30	--	3		
0.18	--	1		

Note :

The above dehydrated onion products are available in two types. Type I : Very pungent. Type II : Mildly pungent.

6.4 QUALITY CONTROL & FOOD SAFETY

6.4.1 Quality control

Although India is the world's second largest producer of vegetables after China, but hardly 1 per cent of the produce is exported. The main constraint is the quality of vegetables. The quality requirements for vegetables for export differ from those for domestic needs. Though uniformity in size and colour are universally accepted attributes, there are several other specific quality requirements for the world market. Some of our country's export consignments have been rejected at the destination for not meeting the recommended international standards due to pesticide residues and contamination with fungicides and other agro chemicals.

Different markets require different qualities. For example, Japan and European markets demand yellow or brown varieties of onion, whereas West Asian and Southeast Asian countries require light to dark red varieties. The quantity demanded also differs in various months owing to no local production, particularly in Southeast Asian countries. In European markets the requirement is mainly from November-December to April-May, when there is no local production or stored produce is not available or preferred by the consumer. We also have a lack of varieties with good shelf life and demand in the export market. Since we do not have good and a uniform variety in any crop, a lot of labour and money is wasted in sorting and grading operations. Moreover, quality control measures at grading and packing levels are also not perfect. Quality control activity contains inspection and testing of receiving, in process and finished product. There are different tests carried out of finished product in quality control lab as follow:

6.4.1PHYSICAL TESTS;

Product	Test parameter	Name of the main instrument/method	Description
Dryer finished product	Color	Scan-O-lite (mini).	Compare the test sample with reference sample in creamy white light.
Dryer finished product	Particle size	By manual sieving for few minutes.	Measuring the cumulative material retaining on different size of screen.
Dryer finished product	Bulk Density	1000 ml measuring cylinder	Measure how much amount of product filled in cylinder
Dryer finished product	Defects	Manually separation and weight measurement	Manually separation and weight measurement of root, skin, bolt, black/burnt, green particle
Dryer finished product	Moisture Content	Infrared Torsion balance	Measure weight loss due to evaporation

6.4.2CHEMICAL TESTS;

Product	Test parameter	Name of the main instrument/method	Description
Process water	Chlorine content	Chemical titration	Measurement of residual chlorine content in water

6.4.3MICROLOGICAL TEST;

Product	Test parameter	Method
Dehydrated white onion	TVC/gm	FDA BAM method
Dehydrated white onion	Yeast & Mold/gm	FDA BAM method
Dehydrated white onion	Coliform/gm	FDA BAM method
Dehydrated white onion	E.coli/gm	FDA BAM method
Dehydrated white onion	Salmonella/50gm	FDA BAM method

6.4.4SPECIFICATION OF THE FINAL DEHYDRATED PRODUCT;

Parameters	Limit
Color	Creamy white < 3
Texture	Firm & crispy
% Moisture	< 6%
Foreign matter	Should be free from it.
% Defects	Max. Root % - 4%
	Skin % - 3.5%
Bulk density	250-500 gm/lit

6.4.2 FOOD SAFETY

This plant is a food processing plant. The food standard has to be maintained to achieve high quality of the product, so that the various food standards are applied for the purpose of food safety. Food standards are the body of foods directly concerning the food stuff from raw material purchasing to retail the food product. There is great emphasis today both on standards of hygiene and on standard method of sampling, analysis, and testing due to expansion of food industry.

Importance of food standards;

Dehydrated onion manufacturing is covered under PFA (Prevention of Food Adulteration) Act & FPO (Fruit Product Order). PFA standards prove that product is now adultered. The FPO specifies the condition of hygiene and sanitation maintain by manufacturers. The Industry also certified under ISO-9001-2000. It specifies requirement for a quality management system that can be used for internal application organization or for certification. It focuses on the effectiveness of the quality management system in meeting customer requirements.

HACCP (Hazard Analysis Critical Control Point);

HACCP is system, which identifies, evaluates and controls hazards, which are significant for food safety.

The main reason for implementing HACCP is to manage food safety and to prevent food poisoning incidents.

HAZARDS:

A biological, chemical or physical agent in food with the potential to cause an adverse health effect.

- **Physical hazards:** Physical agents like metal pieces, metal wire, rubber, plastic, glass, bolt, stick iron powder, cigarette, leaves, tobacco, pouches etc.

can come in contact with product during processing and contaminate the product.

- **Chemical Agent:** Higher ppm of chlorinated water, leakage of oil & grease can contaminate the product.
- **Biological hazard:** Unhygienic condition in plant, storage and packaging room may grow the bacteria & cause contamination of the product. Ex. Salmonella, E.coli etc.

Hazard Analysis;

The process of collecting & evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and there for is addressed in the HACCP plan.

6.5 Onion dehydrated products marketing channel

6.5.1 Market arrival of onion :

We can observe that the arrivals started coming into the market from late January i.e. the crop from late. This produce cannot be stored and needs to be directly marketed. This produce continues in the market till april. While in this time, the rabi crop started in January harvests by mid april. The produce starts arriving into the market. The produce continues to come till june. Part of this produce is used for storage purpose. The rise of arrivals in late October and September can be observed.

The major increase in the price happens in the months of September to December. The price is not only affected by local supply and demand conditions but also other markets situation factors to a certain extent. The plotting of both the data of arrivals and price gives us clear picture of how price is affected to the supply conditions in the market. It can be observed that the prices are high when the supply is low and vise versa.

6.5.2 The various trade channels for Onion identified in the region:

1. Farmer _ Village Trader _ Processing Unit
2. Farmer _ Private Input Trader _ Processing Unit
3. Farmer _ Market Yard _ Trader _ Processing Unit
4. Farmer _ Market Yard _ Processing Unit
5. Farmer _ Processing Unit

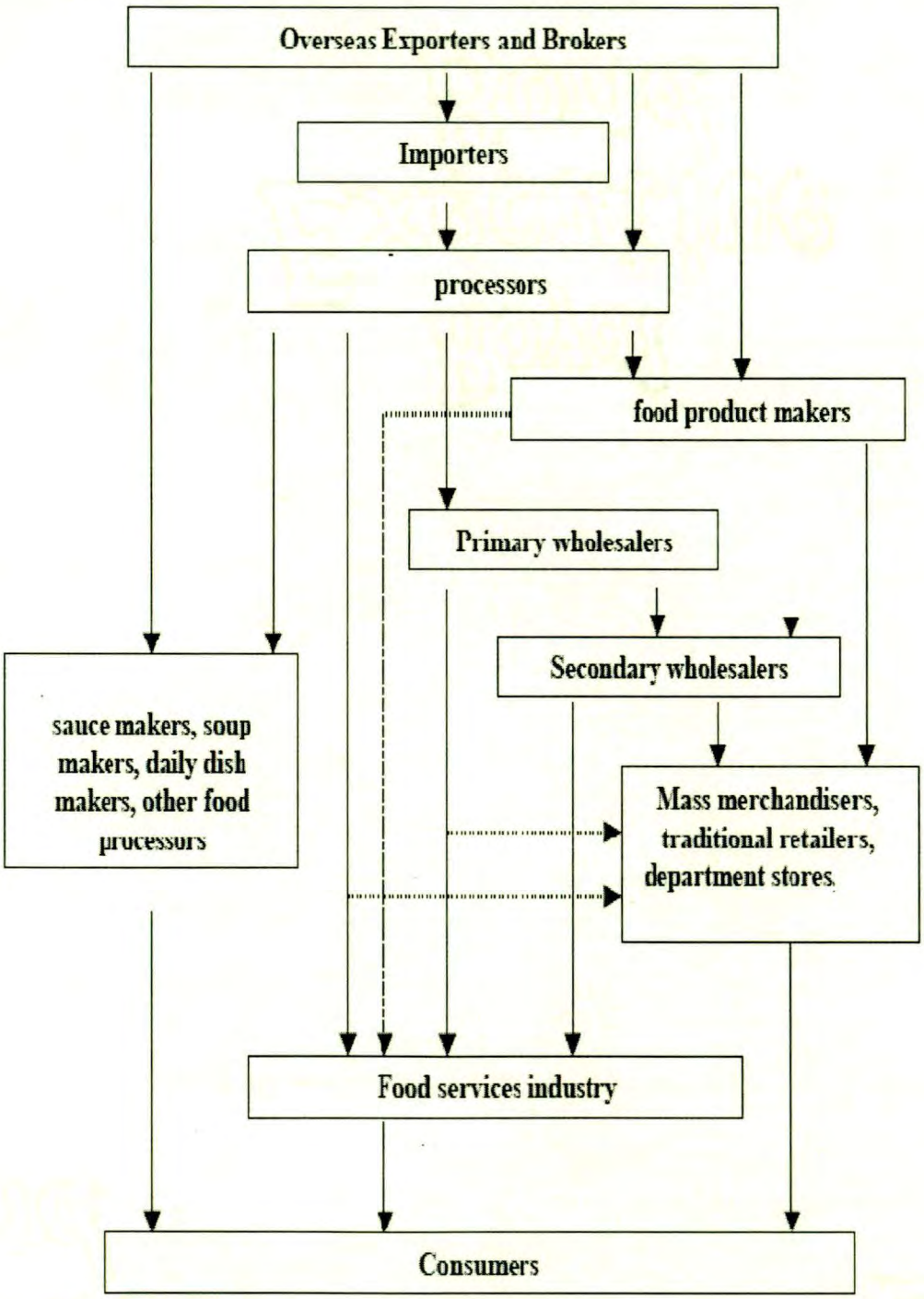
*The transaction between the farmer and the mill owner is facilitated by the commission agents. in few of the cases, the farmer directly approaches the mill owner.

6.5.3 Marketing Channel

The market reforms in agricultural commodities have so far been limited mainly

to food grains only. The marketing of vegetables has so far received little attention of the government. At present, there are a large number of intermediaries in this trade between the producer and consumer which has resulted in a wide gap in the producer and consumer price of these commodities which needs to be reduced to enable farmers receive remunerative prices for their produce and boost their production and consumption in the country. The union government has not made any common regulation for the marketing of vegetables applicable all over the country; however, some of the state governments have enacted laws and Acts. . At present, the wholesale markets for vegetables on a country-wide basis. Use of quality inputs Another problem being faced is that in India, the vegetables are typically grown in field conditions. The concept is opposed to the cultivation of vegetables in green houses as practiced in developed countries for high yields. The average yield for various vegetables in India are low compared to those experienced in other countries of the world. The vegetables sector also suffers from lack of availability of good quality planting material and low use of hybrid seeds. Poor farm management and manual harvesting practices also apply to the vegetables cultivation. Land ceiling has also been a major deterrent for large scale cultivation of fruits and vegetables especially in the organised sector. Ecological issues In recent past, indiscriminate use of fertilizers, water and chemicals in vegetable crops has threatened the environment and ecological balance Hence, to increase production, protect environment and soil, increase profitability, reduce residual effects of chemicals on fresh vegetables, it is imperative to undertake research activities on vegetable production technology including organic farming,

6.5.4 Marketing channel of onion dehydrated products



FINDINGS

CHAPTER-VII

FINDINGS

1) Typical processing plants will handle 4500 kg of raw product per hour(single line), reducing the moisture from around 83 percent to 4 percent (680 - 820 kg finished product). These plants produce 2.25 million kg of dry product per year using from 35 - 46 MJ/dry kg produced (+14 MJ/kg of electrical energy), or 9.3 MJ/kg of water evaporated.

2) Quality control activity contains inspection and testing of receiving, in process and finished product. There are different tests carried out of finished product in quality control lab as follow:

A) Physical tests B) Chemical tests C) Microbiological tests D) Specification of the final dehydrated product E) Food safety

3) We can observe that the arrivals started coming into the market from late January i.e. the crop from late. The rise of arrivals in late October and September can be observed. The major increase in the price happens in the months of September to December. It can be observed that the prices are high when the supply is low and vise versa.

4) Majority of onion growers are small and marginal farmers accounting more than 60% of total area under Cultivation. All growers in Jalgaon area prefer V-12 variety of onion because of-

1. Highest demand for onion dehydration. 2. High Productivity. 3. Fixed price..

5) About 56.66% of farmers are aware about the normal TSS required for onion dehydration process. About 56.66% of farmers have storage facilities. Curing of onion is an important practice for onion dehydration and 68.33% of farmers do the curing on farms.

6)Process involved in onion dehydration is onion receiving, coring, washing, peeling, slicing, drying, milling, packaging and dispatch.

SUGGESTIONS

CHAPTER-VIII

SUGGESTION

1. There should be increase in quality production by planting of v-12 variety of onion on large scale.

2. Jain irrigation should have to lead in the establishment of modern infrastructure facilities like Grading, Cold storage, Transportation facilities in grower's area.

3. Develop domestic marketing of onion dehydrated products by using the improved technology of onion production.

4. Define single point of contact for each trading farmer; this ensures that the information is neither lost nor deteriorates during its flow between the trading farmer.

5. Define agenda for collaboration (short-medium-long term); stabilizing the collaborative goals across the time.

6. Ensure continuous sharing of information; the need to keep continuous information flow is paramount.

7. Trust develops: a real trust-based relationship will only prevail after a relatively lengthy period. Meanwhile, small barriers are removed from the path, which brings confidence to the trading farmer that their long-term vision is tangible.

8. Expanding the scope of collaboration: expand the number of processes, increase the number of products, the level of detail and add trading farmer Because each relationship has its own set of motivating factors driving its development as well as its own unique operating environment, the duration, breadth, strength and closeness of the farmer will vary from case to case and from time to time.

CONCLUSION

CHAPTER-IX

CONCLUSION

1) The range of the subject was wide enough to cover almost all the factors considered to be effective in today scenario. This project has been undertaken to know the operators the quality & quantity of the product.

2) This practical experience has been a great help in improving my personal attribute in the world in the field in coming future.

3) There is need to aware the farmer about the normal TSS required for onion dehydration process. There is need of onion storage facilities at farm level.

4) There is adoption of new technology for onion dehydration processing by company.

5) Quality control measures of onion dehydrated product at grading and packing levels are preferred by Jain irrigation.

6) The maximum arrival indices and price indices of market should be studied and on that basis onion growers should be advised for marketing of onion.

ANNEXURE

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ANNEXURE

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