

## **INVESTIGATE HIGHER VALUE SHARE FOR FARMERS OF MANDARIN (ORANGE) IN NAGPUR DISTRICT, INDIA**



**A research project submitted to Van Hall Larenstein University of Applied Science.  
In Partial Fulfillment of the Requirements of a Degree of Master in Agricultural  
Production Chain Management, Specialization: Horticulture Chains**

**BABLU K. CHAUDHARI**  
12 September 2014

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6700 AK, Wageningen  
The Netherlands  
Email: [info@vanhall-larenstein.nl](mailto:info@vanhall-larenstein.nl)

## ACKNOWLEDGEMENT

It is not sufficient for me to reasonably acknowledge the help, assistance and guidance rendered by a cluster of personalities, but academic decency demands that, so I mention at least few names.

First and foremost, I would like to convey my sincere gratitude and appreciation to The Royal Netherlands Government for providing this scholarship under which I was offered this opportunity to pursue my post graduate degree in Agriculture Production Chain Management specialization in Horticulture Chains.

Secondly, I owe an immeasurable debt of gratitude to Dr. IR. H.P.A. Rik Eweg, Professor of Applied Sciences, Sustainable Agribusiness in Metropolitan Areas, Wageningen, for acting as supervisor to my research. His inspiring guidance, consistent encouragement, everlasting patience and intellectual suggestion fueled my efforts to achieve the endeavor. I acknowledge this fatherly with deep sense of gratitude.

At the same time, I wish to place my sincere thanks to all staff of the Van Hall Larenstein University of Applied Science. My sincere appreciation goes to my course coordinator Mr. Geert Houwers for his support and encouragement through the study.

It gives me immense pleasure, to express my profound indebtedness and heart full thanks to Dr. Vijay K. Paralkar, International Agriculture Scientist, USA, Dr. Mukund Gaikwad, Chancellor of Arvind Deshmukh Agriculture University, Nagpur, Dr. Uday Patil, Commissioner of NAREGA, Ministry of Agriculture, Nagpur, DR. Narendra Bhusari, Professor of Botany, Abhinandan College, Nagpur and my sincere thanks to Mr. Gajanan Girolkar, President of NGO, Nagpur, under whose constant encouragement, suggestions and help, I could achieve this in my carrier, It would not have been possible for me to complete the herculean task.

Finally, my special thanks go to my family who supported and encourage me throughout the study period.

## **DEDICATION**

This work is dedicated to my beloved mentor, Late Shri. Kishor Bhusari, who love enabled me to withstand all types of stress and came up in my life.

## ABSTRACT

The research was conducted to investigate the profitable value share for farmers of mandarin in Nagpur district in India. The study investigated current marketing channel, marketing constraints, including factors such as price quality of mandarin, their bargaining power and source of information and the functions of different actors and influence in the mandarin chains. Thirty six mandarin producers were randomly selected from 6 major mandarin producing towns in Nagpur district. Data was gathered using structure questionnaires which focused on mandarin quality requirements, price determination of mandarin, constraints in mandarin business and source of information. Other stakeholders were interviewed including one commission agents, one retailer, one wholesaler and one government officer. The chain map was used to analyze the mandarin chain.

My research revealed that there was only one marketing channel or system used by mandarin farmer. 77.78% of the producers sold their mandarin through a pre-harvest contractor to commission agent and remaining 22.22% were sold directly to traders or C.A.s., it's because farmers don't know about marketing and target market, the main reasons is that commission agents know the market and have a good relation with traders and wholesalers. The result of the study revealed that 80% farmers were producing 15-17 ton/ha and all mandarin sold through commission agents. Quality of mandarin was checked at APMC market by C.A.s.

95% of farmer's mandarin price set by the commission agents. As a result 92% of the producers are dissatisfied with the price of mandarin that was being offered by commission agent. My research revealed that 6 mandarin towns in the Nagpur district 65% of the mandarin producers were living in between 50-60 kilometer from APMC market; this have affects the mandarin quality and price. The more the distance lowers the price because travelling distance effect on quality of mandarin. 22% of the mandarin producers got information about all technical services from Nvyss (NGO). The information obtained was mainly on disease control, price and quality of mandarin. In APMC, there is no cold storage facilities, no grading and packaging unit which directly effects on mandarin quality and its leads to low profit share for the farmers.

The district mandarin producers are located far from different city markets, thus their main mandarin outlet is through the APMC market. It was noted that several factors constraint the mandarin market environment which includes long distance between the producers to the APMC market, lack of technical knowledge about production of mandarin and marketing, quality management, grading and packaging, high transport cost, poor coordination among the chain actors, inadequate extension service from service provider, farmers act individually instead of group organization, no bargaining power and C.A.s. domination in the mandarin chain. Therefore, forming farmer's organization group and similar form of united action is path to reduce high transaction costs, increase bargaining power and obtain the necessary information, improving the post-harvest facilities like grading, packaging and cold storage unit. Nvyss and farmers need to contract with each other for extension services and search for new marketing channels with the help online mandarin apps (website); introducing new marketing channels can open up new marketing opportunities for district mandarin producers.

I worked on new chains up gradation and quality requirements of mandarin for high value share in the market. I have invented 3 new value chains that will give farmers higher value share, without an intermediate between the farmers and the consumers. I focus on chains in which farmers directly sell their mandarins to consumers without any constraints with the help of NGO (Nvyss).

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## **ABBREVIATIONS**

APMC	Agriculture Produce Marketing Committee
ATMA	Agriculture Technology of Marketing Agency
CAs	Commission Agents
CIAT	International Centre for Tropical Agriculture
DOMI	Directorate of Marketing and inspection
DOAC	Directorate of Agriculture and Cooperation
DR	Doctor
FYM	Farm Yard Manure
GAP	Global Agricultural Practices
HA	Hectare
JDAO	Joint Director Agriculture Office
MT	Metric Tonne
NAREGA	National Rural Employment Guarantee Act
NHM	National Horticulture Mission
NHB	National Horticulture Board
NVYSS	Nav Vikas Yuva Seva Sanstha
NGOs	Non-Governmental Organisation
NRCC	National Research Centre of Citrus
PACS	Primary Agriculture Credit Society
SDAO	Superintendent of District Agriculture Office
SWOT	Strength Weakness Opportunities Threats
RS	Rupees
TAO	Taluka Agriculture Officer

## Chapter 1: Introduction

Horticulture remains the priority sector in achieving sustainable economic growth in India. This is because the country has immense natural resources such as land, water and fertile soil to support agriculture activity. In addition over 69 % of the rural population depends on farming for their live hood (National horticulture board third estimate 2011-12).

The Agriculture sector in India is divided into six subsectors; Agriculture Crops: Cereals and Pulses; Horticulture and Floriculture Crop: Flowers, Fruit crop and vegetables; Livestock: Cattle, Sheep, Goats and Poultry, Fisheries: Marine and Aquaculture; Forestry & Sericulture. First two subsectors are under the NGO. The Agriculture sector contributes about 19.70% to GDP (GOI, 2013) and offers the most employment opportunities in the country.

Mandarin orange (*Citrus reticulata*) is most common among citrus fruits grown in India. It occupies nearly 40% of the total area under citrus cultivation in India. The most important commercial citrus species in India are the mandarin (*Citrus reticulata*), sweet orange (*Citrus sinensis*) and acid lime (*Citrus aurantifolia*) sharing 41, 23 and 23 % respectively of all citrus fruits produced in the country. (NRCC, 2013)

Citrus fruits occupy an important position in India's fruit production. Citrus fruits which include sweet oranges, lemon, mandarin and lime are primarily consumed as fresh fruits. These fruits are processed on mainly to prepare squash, juice, marmalade and pickles. These fruits are a rich source of vitamin-'C' and mineral salts. Area under orange crop in Vidarbha region is about 65,000 hectares with annual production of about 4250004 tons (0.42 million ton). Farmers, pre-harvest contractors, commission agents, wholesalers and retailers are the various functionaries involved in marketing of oranges. These agencies perform different activities in the marketing of oranges by which the orange fruits reach the ultimate consumer. These functionaries face different problems which affect the marketing system of oranges and put the producer on one hand and the consumer on the other at a great loss.

### 1.1 Reason for the research

Nagpur mandarin is one of the best mandarins in the world. Production of this fruit crop in central and western part of India is increasing every year. The Small holder farmers are producing mandarin and contributing good produce in Nagpur. But the district farmers get a low value share and delayed payment from other actors. It is therefore important to analyse the chains and finds a ways of strengthening them and encourages their development. This can only be achieved by finding meaningful solutions to the challenges of NVYSS farmers. It is therefore incumbent upon me as a Project co-ordinator to perform and help such upcoming mandarin Industries. Nav VikasYuva Seva Sanstha (NGO) has 60 mandarin producing farmers, 35 farmers having an average of 2 ha land and 25 farmers having more than 2 ha lands. The mandarin production is taken two times in year. The first season known as ambia bahar lasts from October to January and another one is Mrug bahar lasts from June to September. According to NRCC the fruit yield

of Nagpur mandarin was recorded significantly maximum (18-20 ton/ha) on rangpur lime. But farmers have faced some serious challenges and problems to supply mandarin in market. Most of the time farmers face delayed payment from the commission agents. As a result of these, over 15 000 farmers have committed suicide since 2003 according to reliable records (Deshpande, 2006). The NVYSS provide extension services to the farmers for quality production. The mandarin chain needs to be analysed so that challenges and constraints are identified and possible interventions sort to receive higher market price for their mandarin.

## 1.2 Background



Country population- 1.237 Billion

Maharashtra state population- 115 Million

Nagpur city population – 2.5 million

Major business and education hub, agriculture, construction business, investment sector and sports centre.

Figure 1: India map showing Nagpur position

Source: States and Union Territories, ( 2011)

Mandarin orange which is an important citrus fruit is grown on large scale in Nagpur and Amravati districts of Vidarbha region. Its cultivation is now spread in Wardha district also. These fruits are popularly known as “**Nagpur santra**”

The value chain includes a series of activities product/services must pass through until it serves its final purpose of solving a customer need. At each stage of the product or service gains some value. If a phase is malfunctioning the chain will break down and the mission of generating value for the customer will not be accomplished (TBK, 2012).

**Source- Verschuur, (2013)**

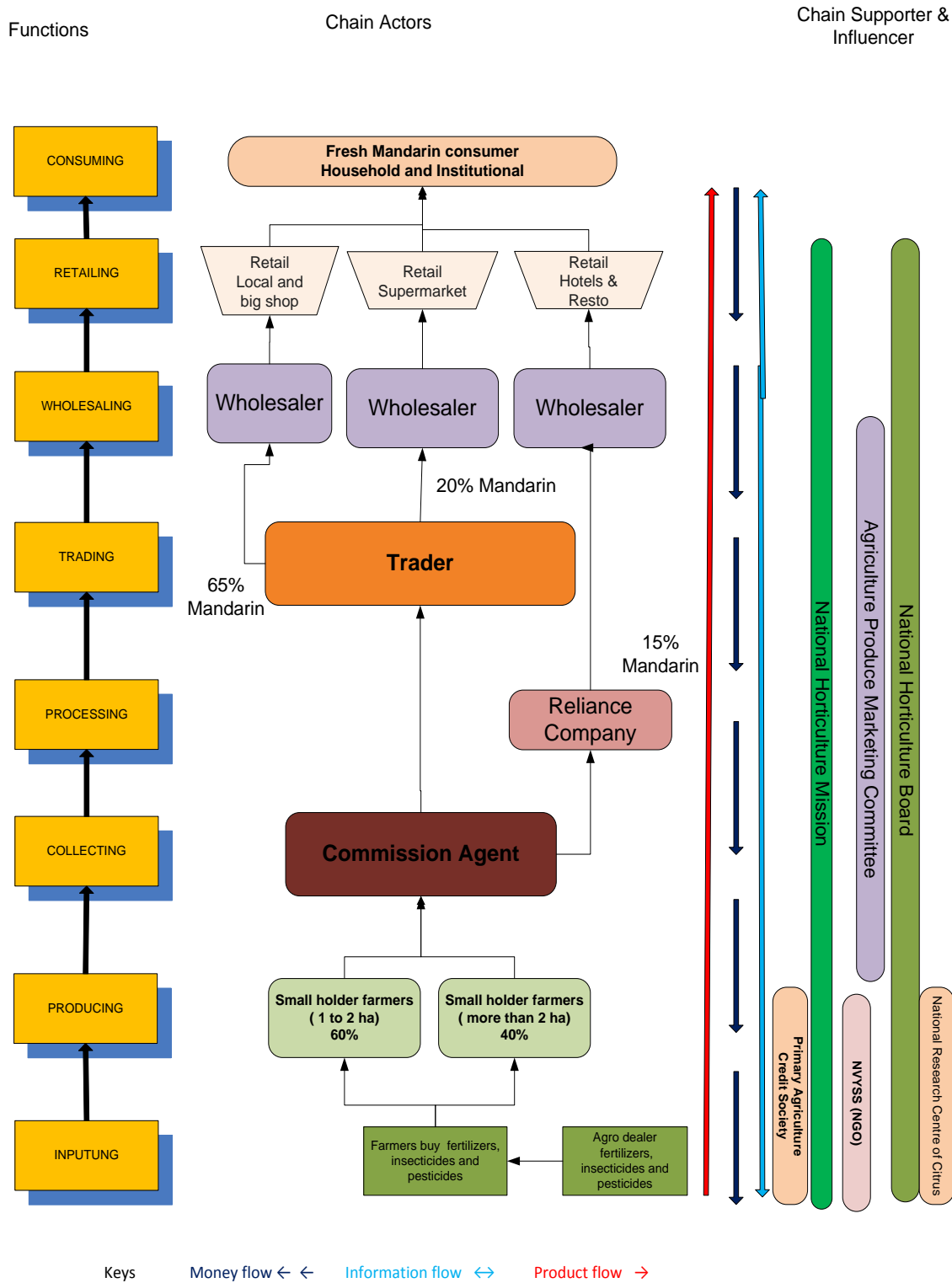


Figure 3: Current mandarin chain map in Nagpur district (NVYSS 2012)

## 1.4 Stakeholder matrix

The major actors involved in the mandarin chain are farmers, commission agents, traders, wholesalers and retailers. The stake holder analysis is done in order to find out there functions in the chain and subsequently identify their constraints in the mandarin Chain.

Actor	Role Played in the Chain	Risks and Constraints Encountered in the Chain	Cost Encountered.
Farmers	Farmers sell their mandarins to pre-harvest contractor to the APMC market where mandarin is sold to traders and other actors through commission agent. C.A. set the mandarin price and farmers don't have any bargaining power. Pre-harvest contractor is a link of C. As.	High cost of improved rootstock and input material from market. Heavy infestation of insect and diseases. Cost of insecticide and pesticide is high. Farmers fail to control the quality of the mandarin due to lack technical knowledge. Farmers are unknown about latest market information, prise fluctuation. Due to improper grading farmers lost the quality of fruit and money. Small holder farmer face financial problem, farmers borrow the money from commission agent for purchase inputs with agreement that the farmers sell their mandarin to commission agents and C.As. Mislead with farmers in terms of delayed payment and high interest on finance.	Input cost, farm equipment, insecticides, pesticides, Transport, Labour, market fees. Loss of mandarin through Diseases and Poor farm practices and tillage operations. High cost of cultivation
Agro Dealers	Supply inputs, insecticides and pesticides, farm equipment's and fertilizers.	Highly dependent on farmer for payment, failure by farmers debt, competition with cheaper products and competitors.	Transport costs, loss of stock through expiry and bad debt.
Commission Agents	Commission agents are registered with APMC. They are interested in market system which provide them a steady and increase income from purchase and sell. Main functions of C.As. are purchase mandarins from farmers at low price and sell to traders at higher price.	Commission agents depend on traders for the payment. Competition with other the commission agent for powerful position in the market. Lack of processing and cold storage facilities in the APMC. Poor grading and packaging due to unskilled labour.	Market fees, processing and cold storage cost. Rent of lands. Grading and packaging cost.

<b>Actor</b>	<b>Role Played in the Chain</b>	<b>Risks and Constraints Encountered in the Chain</b>	<b>Cost Encountered.</b>
Processors	On an average 15-20% mandarin are bought weekly by local processor for making mandarin juice and powder. Processors buy either smallest or ripe mandarin which cannot sent to local market	Sometimes processors face serious problem while processing mandarin such as rotten mandarin, poor quality after time, unskilled labour. Break down in packing machine, load shading (Electricity interruption)	Processing cost, electricity cost, market fees, storage cost
Traders	Traders inform their desired purchase quality to the commission agents after enquiring the price and demand of produced at distance market. Traders further graded the produce on their own parameters depending on requirement of distance market and then pack in wooden box and transport to the wholesalers at distance and local market.	Trader's migrant labour from other state for grading and packaging, unskilled labour, electricity interruption. Traders highly depend on commission agent for produce and its price.	Transportation cost , grading and packaging cost, market fees, loading and unloading cost, labour cost, land rent
Wholesalers	Wholesalers are based at consumption market and mainly distribution produce deal with the retailers in particular cities and town. Most of the big wholesaler in main markets of India are closely linked with traders may be even related.	Highly dependency on traders and retailers order. Difficult to control quality. Damage of produce in transport and loading in truck from trader	Cold Storage cost
Retailers	Retailers buy mandarin through the wholesalers from distance market and then sell it to local consumers and super markets and institutional consumers such as hotels and restaurants.	Competition with cheap local mandarin and price	Transport cost, shop cost, wage and rent

## 1.5 Consumer groups

Institutional consumers - Institutional consumers based on hotel, restaurants and juice centres. These consumer group directly purchase fresh mandarin at APMC market from commission agents or traders in a bulk quantity at moderate price and later they server juice and orange pieces to consumers.

High income consumers- In Nagpur only 15% rich people called as high income consumers buy mandarin and juice from supermarket at higher price. They always prefer quality above quantity.

Middle income consumers- Around 40% middle class consumers exist in Nagpur. They buy mandarins and juice from big and small shop in the city. They always prefer both quality and quantity of mandarin at moderate price.

Low income consumers – This consumers group exists at higher level (45%) in Nagpur. They buy mandarins from street market and local shops. They always believe in quantity at cheaper price.

(JDAO, 2006)

## 1.6 Chain supporters and influencers

**Table 1: Existing chain supporter and influencers**

Chain Supporters and Influencers	Roles
National Research Centre for Citrus	Provides strengthening of research on citrus in Nagpur.
National Horticulture Board	Provides 50% subsidy for drip irrigation
National Horticulture Mission	Provides 40% subsidy on rejuvenation of plant & information.
NVYSS (NGO)	Provides extension services & projects.
Agri. Produce Marketing Committee	Provides market place where mandarins sell out farmers to various actors.
Primary Agri. Credit Society	Cooperative bank provides the loan to the farmers with the help of commission agent.

## **Chapter 2: Research**

### **2.1 Research title**

Investigate higher value share for farmers of mandarin (Orange) in Nagpur.

### **2.2 Problem statement**

Nagpur Mandarin is an important fruit crop that is widely produced in India by the farmers. "Commission agents are playing a major role in the APMC (Agriculture Produce Marketing Committee) system and thus neither the farmers nor the consumer get the right price". (NHM, 2008)

Commission agents have a very powerful position in the mandarin market and they provide the finance to farmers at high interest rates and purchase farmer produce at low prices and sell to traders at higher prices without informing the farmer. Commission agent has good relationship with trader and wholesalers. This is the only channel existing in Nagpur district. (NHM, 2008)

Value chain of commission agents work ineffective resulting in delayed payment/ unequal distribution of mandarin in Nagpur district.

There are no alternative value chains/ market channels in Nagpur.

### **2.3 Problem owner: NVYSS (NGO) Nagpur**

The organization was established by Mr. Gajanan Girolkar who is the president of NVYSS in 1989 with the objectives of the improvement of the livelihood standard through the agricultural activities. The organization started to organize the farmers' groups for collective production and marketing. Since 2008 NVYSS provide extension services to over 200 farmers right from raising seedling to harvest as well as marketing.

The NVYSS (NGO) is the lead organization in Nagpur and responsible for developing and executing policies and strategies for the agriculture sector within the context of a coordinated district socio-economic growth and development agenda, (NVYSS, 2009). The NVYSS is the district level organization & ensures the development and effective implementation of all Agricultural programmes in the district level. The activities and programmes of the NVYSS have to conform to the vision, mission and objectives of the organization which is set at the state level.

### **2.4 My role/task**

I am the District Project Coordinator in charge of horticultural crops mainly mandarins and my responsibilities include but not limited to the following: Integral part of technical team members of our projects for promoting research, development and training particularly in installation and management of green and poly house and open field exclusively for production of horticultural crops at our central demonstration sites & at farmers fields, I am engaged in providing technical

guidance & support to the associated farmers, facilitating community groups markets & contract farming systems, developing horticultural production & supply chains with multi-stakeholder participation, processing for value addition & post-harvest handling for fruits & vegetables. Compile & submit quarterly reports to district office of NVYSS.

### **Mission**

The NGO has a Vision, Mission and Objectives.

The **vision** of the NGO is; to create a powerful agriculture that works for everyone with healthy and empowered nation.

The **mission** of the NGO is; **Education – Development – Empowerment**

to promote sustainable agriculture and thriving agribusiness through research and technology development, effective extension and other support services to farmers, processors and traders for improved livelihood, (NVYSS, 2009).

#### **NGO objectives:**

- Improved growth in incomes
- Provide technical support to farmers in developing agriculture
- Provide technical education to farmers
- Arrange agriculture demonstration, exhibitions and study tour
- Science and technology applied in food and agriculture development
- Improved institutional coordination

### **2.5 Research objectives**

- 1) To help NVYSS to identify potential and develop new marketing channels and strategies that offers a healthy price for mandarins produced by farmers in rural area in Nagpur district.

### **2.6 Research question**

#### **Research question 1**

- 1) How is the detailed structure of the present mandarin value chain in the Nagpur district?

#### **Sub questions**

- 1.1) What are the functions of different existing actors in the mandarin market and their relationship?
- 1.2) Who are the relevant (existing and new) supporters and influencers in the mandarin market, who could contribute to new and more effective marketing channels and what can be their roles?
- 1.3) What is the division of value share of the actors in the existing mandarin chain in Nagpur?
- 1.4) What is the present knowledge and information level of farmers for marketing mandarins?

## Research question 2

- 2) What new value chains which are more profitable to farmers are feasible in Nagpur? And what kind of strategies can be adopted at NVYSS to support implementation of these new mandarin chains?

### Sub questions

- 2.1) what are the mandarin quality requirements for the high price markets?
- 2.2) what are present and potential methods of marketing used by the farmers for marketing their produce and their market outlets?
- 2.3) what chain upgrading need to be established?
- 2.4) what should be the first steps of NVYSS to help to implement these chains?

## 2.7 Definition of terms

**Chain relation:** Relationship between two or more chain actors. (KIT and IIRR 2008)

**Stakeholder:** These are people who directly involved in the mandarin value chain in Nagpur district. It includes chain actors, chain supporters and chain influencer.

**Trader:** Traders are people who buy mandarin from the commission agent and sell to retailers or end consumer.

**Pre-harvest Contractor:** It is a link of commission agent who harvest and collects the mandarin from the farmer's farm and transport the fruits to the commission agent.

**Commission agent:** A commission agent/middle man is an intermediary between the producers of mandarin and market traders.

**Retailers:** Retailers are the part of supply chain system that purchase mandarin in large quantities from producers, traders or wholesale market and then sell smaller quantities to consumer for a profit. (Patil, 2002)

**Value chain:** It is a chain of activities that a firm operating in a specific industry performs in order to deliver a valuable product for the market.

**Value chain development:** It is a strategies used to improve mandarin farmers participation in chain activities and their involvement in management of the chain.

**Value shares:** The percentage of the final, retail price that the actors earn (KIT and IIRR 2008)

**Profitability:** It is the return to investment given by profit divided by cost price expressed as a percentage.

## **Chapter 3: Literature review and Conceptual framework**

### **3.1 Mandarin market**

Bhole (2004) performed his research on mandarin chains in Nagpur and Amravati districts in 2004. As he made a complete analysis of the mandarin market in the same study area as my research area (Nagpur district), I rely on his study for a description of the mandarin market in Nagpur.

According to Bhole, (2004) "Amravati and Nagpur districts of Vidarbha which together account for more than 90 per cent of the total area under orange crop in Vidarbha". Bhole selected for his study two orange markets from Amravati district namely Amravati and Warud and three markets from Nagpur district namely Kalmeshwar, Katol and Narkhed. Thus the study covers total five markets. All these markets are mainly producers markets and are administratively controlled by the Agricultural Produce Market Committee (APMC). The main functionaries operating in these markets are commission agents / dalals and wholesalers. The Agricultural Produce Market Committee is manned by Secretary, Joint Secretary, Accountant, Market Inspector and Clerk. In 2001-2002 average per quintal price of oranges in the markets under study was Rs.700 and Rs.900 for in Ambia and Mrig bahar, respectively. In all the markets, orange prices in Mrig bahar were higher than Ambia bahar.

Bhole drew sample of 90 farmers from Amravati and Nagpur districts. Farm level data on production and prices of oranges from these farmers were collected for two agricultural years i.e. 2000-01 and 2002-03. For studying the role and problems of intermediaries, a sample of 50 pre-harvest contractors, 50 wholesalers, 25 retailers, 45 commission agents, 25 packing centers and 25 transport agencies was drawn from the selected markets. Data from the farmers and the intermediaries were collected by personal interview method in a specially designed schedule. Secondary data on market arrival, prices, etc. were collected from the reports of various Agricultural Produce Market Committees. Simple tabular analysis was adopted as the analytical tool for accomplishing the objectives of the study.

### **3.2 Market system**

Most commonly followed methods of sale of oranges in the study area were (i) selling fruits to the pre-harvest contractor and (ii) selling fruits in the Agricultural Produce market committees. It was observed that 79 per cent farmers sold their produce to the pre-harvest contractor while 21 per cent farmers sold the produce in the APMC. No farmer sold his produce directly in the distant market, it sold by pre-harvest contractor. Regarding proportion of produce, 81 per cent of the total produce was sold through pre-harvest contractors while 19 per cent produce was sold in the APMC. High risk of spoilage of fruits, no guarantee of remunerative prices in other methods of sale and easy terms of payment by the pre-harvest contractors were the important reasons quoted by the farmers for their preference to the pre-harvest contractors. Some farmers (21 per cent) preferred to sell their produce in the Agricultural Produce Market Committees. Reasons quoted by these farmers for selling the fruits in APMC were the expectation of higher net price in APMC and informal relations of the farmers with the wholesalers operating in the Agricultural Produce Market Committees. Bhole, (2004)

The pre-harvest contractor in general harvest the fruits from garden. He has purchased in two plucking. More than 60 % of the fruit are harvested in first plucking. The payment made by the pre-harvest contractor to the farmer after each plucking is in the production of the produced

harvested. The pre-harvest contractor and wholesaler sold almost entire produce procured by them in the distant market of big cities. Higher price in the distant consumer markets tempted the pre-harvest contractor and wholesaler to sell the produce in these markets. Bhole, (2004)

### 3.3 Chain relations

Farmers selling their produce to the pre-harvest contractor did not incur any marketing cost. However, farmers who sold the produce in the Agricultural Produce Market Committee incurred an expenditure of Rs.67.57 per thousand orange fruits. Transportation cost was main item of marketing cost of the farmer. Marketing cost in Mrig bahar was higher (Rs.82.69 per thousand fruits) than the Ambia bahar (Rs.62.77 per thousand fruits). Marketing cost of the pre-harvest contractor in the APMC was Rs.53.10 per thousand fruits. In distant market sale in loose and box consignment, the pre-harvest contractors incurred total marketing cost of Rs.274.74 and Rs.501.59, respectively. Bhole, (2004)

Four marketing channels were observed in marketing of oranges in the study area. In the first channel the produce moved from producer to pre-harvest contractor, local wholesaler, retailer and then consumer. In the second channel the produce moved from producer to the local consumer through local wholesaler and retailer. In third channel the produce moved from producer to the distant consumer through pre-harvest contractor, distant market wholesalers and then retailer in the distant market, while in the fourth channel local wholesaler distant market wholesaler and retailer were involved in the movement of fruits from producer to the distant market consumer. In distant markets fruits were carried in trucks either as loose or in boxes. For Ambia bahar producers received average price of Rs.199=00 per thousand fruits in channel-I and channel-III (loose and box consignment) and Rs.271.00 per thousand fruits in channel-II and channel-IV (loose and box consignment). Producer's share in the consumer's price was highest in channel-II (42.21 per cent) and lowest in channel-III (17.83) in which the local wholesaler purchases the fruits from the pre-harvest contractor and send the same to the distant markets in wooden boxes. In Mrig bahar prices received by the farmers were higher, being Rs.447.50 per thousand fruits in channel-I and channel-III and Rs.493.17 in channel-II and channel-IV. As in case of Ambia bahar, in Mrig bahar also producer's share in consumer's price was highest in channel-II (46.57 per cent) and lowest being 25.08 per cent in channel-III. Bhole, (2004)

My conclusions on chain relations based on the study above are:

- The pre-harvest contractor is the main agency to whom the produce is sold by the farmers.
- Marketing cost for wooden box consignment of oranges in distant markets is very high. Alternative methods of packing of oranges therefore, need to be developed.
- Orange prices in the distant markets of big cities are quite high. However, because of the existence of intermediaries farmers cannot take advantage of these prices. Marketing of oranges on cooperative basis can help the farmer in getting higher prices for their produce.

### **3.4 Constraints faced by chain actors**

According to Bhole, (2004) in the mandarin chain every chain actors faced some constraints which are mentioned below

#### **1) Farmers**

Farmers and the various functionaries working in the market face numerous problems in orange fruit trading. Farmers either sell their produce to the pre-harvest contractor before harvest or they sell it in the nearby Agricultural Produce Market Committee. Main problems encountered by the farmers while dealing with pre-harvest contractor were

- Delayed payment
- Delayed harvesting of oranges
- Breaking contract if the orange prices slash down
- Cut in the payment of farmer in the event of loss of fruit due to dropping.

#### **2) APMC**

When the farmers sell their produce in the Agricultural Produce Market Committee, they face following problems.

- High commission charges.
- High transportation and loading and unloading charges.
- No guarantee of remunerative prices.
- Delayed payment by commission agents.

#### **3) Pre-harvest contractor**

Functionaries working in the market also face various problems. The pre-harvest contractors who purchase the fruits from the farmers face problems while dealing with the farmers. These problems arise mainly due to:

- Lapses on the part of farmers in the management of garden resulting in deterioration of quality of fruits.
- Problems of natural calamities (theft of fruits, losses due to rains, pest, etc.).
- Problems of storage facilities (lack of cold storage at local place).
- Packing problem (costly packing material and non-availability of skilled labor).
- Transport Problems (high transportation cost and non-availability of transport means in time).
- Grading problems (non-availability of suitable mechanical graders)

The reason of delayed payment is that pre-harvest contractor depends for his payment on traders, wholesalers and retailers. It's like a chain: each actor depends on each another for payment for his deal and that directly affects the farmer's community. Sometimes a contractor receives payment on time but he invests that money in other vegetable chains and for that the reason farmers face delayed payment.

## **5) Wholesaler**

The problems faced by the wholesalers are related to:

- Transport (costly and inadequate road transport).
- Labor problem (inadequate labor supply during season).
- Packing problem (costly packing material).
- Financial problems (lack of finance).
- Problems related to the infrastructural facilities in the market yard.

## **6) Packers**

The Packing center owners face following problems in their business.

- Costly packing material.
- Inadequate and inefficient labor supply for packing work.
- Lack of infrastructure facilities like cold storage, telephone, etc. and
- Financial problems.

## **7) Retailers**

Retailers in the local market also have their own problems, the important among them being

- Risk of spoilage of fruits due to their perishable nature.
- Costly transport and
- Lack of proper shops / space in the local market to display the fruits.

Processing of oranges is highly profitable. These are few orange processing units in the study area. These units produce orange juice, orange squash, orange marmalade and orange slices. Processing of oranges into these products is highly profitable. The profits and the rate of return in all these products are quite high. Bhole, (2004)

## **Conclusions**

This is the overall conclusion mentioned by Bhole, (2004) derived from his study:

- The farmers are at disadvantageous position in terms of their share in the consumer's price in all the marketing channels. The co-operative or collective marketing of oranges can come to the rescue of farmers in this situation. The cooperative marketing will eliminate the intermediaries and thereby increase farmers' share in the consumer's price.
- Risk due to natural calamities is the main reason for the farmers for selling the produce to the pre-harvest contractor whose terms are generally against the farmers.

The Crop Insurance Scheme, which is applicable for other crops in Maharashtra, should therefore, also be made applicable to orange crop.

- Lack of cold storage facilities in the orange producing area is the main difficulty expressed by producers, pre-harvest contractors and wholesalers. These facilities should be created in the study area. Availability of cold storage facilities will help in balancing the supply - demand position and maintaining the price level.
- Presently grading of oranges is done manually which is time consuming. Mechanical grading devices need to be developed for this purpose.
- Processing of oranges need to be developed in the study area so that farmer can take advantage of 'value addition' to their produce by way of processing.
- To develop network of marketing on cooperative basis to overcome constraints in marketing.
- Backward and forward linkages for training in production and marketing should be arranged on priority.

Bhole's research stopped at the conclusion over the constraints faced by all chain actors in the current market of mandarin. I appreciate his research work but my research focused on to provide profitable value share for farmers in Nagpur district. I worked on new chains, up gradation and quality requirements of mandarin for high value share in the market. I have invented three new value chains that will give farmers higher value share, without an intermediate between the farmers and the consumers. I focus on chains in which farmers directly sell their mandarins to consumers without any constraint with the help of an NGO (NVYSS).

### **3.5 Theoretical framework**

For my research I have used Link methodology (CIAT 2013) to develop an innovative model for my research.

#### Link model:

Key tool 1- Value chain map: A strongly visual approach to the classic mandarin value chain analysis, divided into a nested perspective of core process, existing and new partners network and external influences.

Key tool 2- The business module canvas: Adopted from Osterwalders innovative approach (Osterwalder, 2012), this participatory tool has proved to be very valuable for small scale farmers, NGOs and buyers in understanding the business goal and practices of mandarin farmers.

Key tool 3- The new business model principles: Represent a set of signposts to help evaluate current business practices in terms of their inclusiveness, and to deliver practical ideas on how to enhance a business inclusiveness of the mandarin chain in Nagpur.

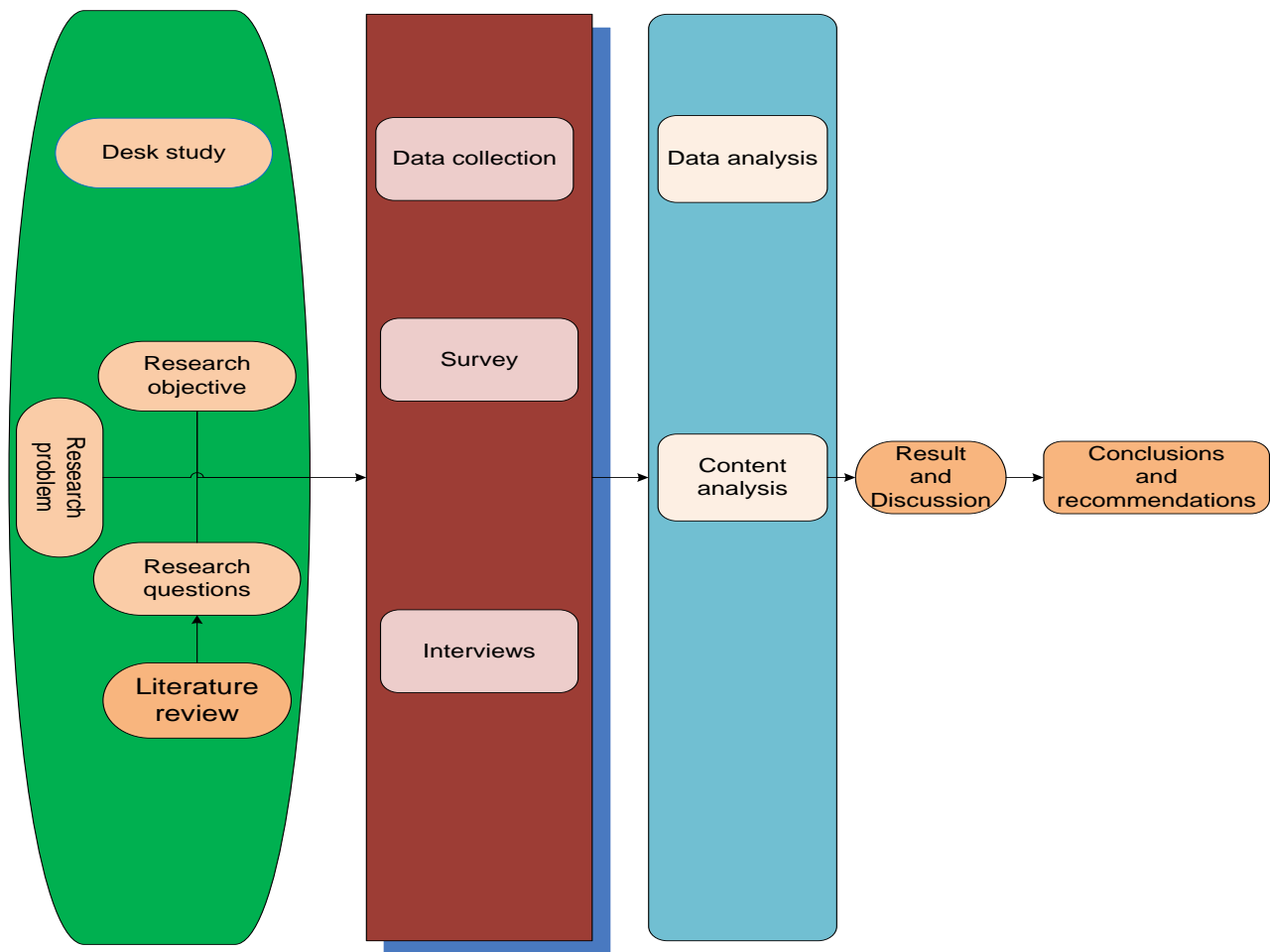
## **Chapter 4: Methodology**

### **4.1 Introduction**

This research is based on a quantitative and qualitative approach based on the survey, interviews and desk study. The secondary data were collected through desk study, while primary data were collected through field survey and interviews by using a semi-structured questionnaire and checklist respectively. The desk study is carried out to find out the organization of chain, market system, and mandarin chain relationships. The survey and interviews were carried out to gather information from the farmers, commission agent, wholesalers, retailers and government officers in the mandarin chain and to investigate the farmers' value share in the mandarin chain.

### **4.2 Research methodology**

Figure 3 shows how the research was structured by desk study, literature review, and field study. The results of the field study were analyzed separately. The results were compared with literature review during discussions. At the end conclusions and recommendations were made based on the results and discussions.



**Figure 4: Research framework**

### 4.3 Desk study

Desk study was carried out to search the background information about the mandarin value chain, marketing strategies & quality. The materials that were used were: reports, books, articles, journals, and official statistical data. The use of existing materials was to help to gain the information of the value share of farmers and the marketing process. The information gathered from desk study will be used to compare with the findings of the field research. The following topics were searched during desk study.

- Mandarin value chain analysis report
- Different market channels
- Market constrains and chain up gradation
- Quality attributes

#### **4.4 Survey**

A questionnaire was used to collect primary data. The survey was carried out on randomly selected farmers. I have selected 6 towns in Nagpur district and 6 farmers from each town were selected on the basis of NVYSS farmers report. Altogether 36 randomly selected farmers were surveyed. 18 farmers who have less than 2 hectares of Land and other 18 farmers who have more than 2 hectares of land were surveyed during field research. The questionnaire (see annex 1) focused on the mandarin value share, market channels, strategies, constrain in the mandarin chain. Questionnaires were filled from 20th July to 31<sup>st</sup> July in Nagpur district. 6 towns were chose, and in each town 6 farmers were surveyed, in Katol, Kalmeshwar, Narkher, Saoner, Kamthi and Umred.

#### **4.5 Interviews**

A personal and semi structured interview was conducted to get information from a government officer, commission agent, retailer and wholesaler. This was helpful to gain insight information about the organization of the value chain of mandarin, constraints of mandarin chain stakeholders and quality requirements of buyers.

Altogether 4 personal interviews were carried out, among them, including one with the Superintendent District Agriculture Office (SDAO). A personal interview was also carry out with one local Commission agent, one wholesaler and one retailer. The issues raised in the interviews were: basis of trading of mandarin, value share, quality standards of markets and constraints in different steps of the mandarin chain.

#### **4.6 Design the new value chain and implementation**

I came with new designs for value chains after my results from surveys; interviews and the motivational discussions with experts. Literature from other different regions or countries was helping me to design a new value chain for Nagpur district in which farmers are able to get a higher value share in the mandarin chain.

#### 4.7 Study Area

This study was carried out to investigate the value share for mandarin farmers in Nagpur district. Therefore, six major mandarin producing towns in the Nagpur district were selected as the study area for the research. According to the SDAO (2011), In Nagpur district major mandarin producing town are Katol, Kalmeshwar, Narkher, Saoner, Kamthi and Umred shown is the map.



Figure 5: Map showing six mandarin towns in Nagpur district

Source: SDAO, (2011)

Nagpur district is strategically located in the middle of India. Nagpur is the largest city in central India and the second capital of the state of Maharashtra. It has been cited as one of the future global cities. Nagpur is a fast growing metropolis and known as orange city and is the third most populous city in Maharashtra after Mumbai and Pune, and also one of the country's most industrialized cities.

**Table 2: Summary of interviews**

<b>Sr.No.</b>	<b>Stakeholder</b>	<b>Survey</b>	<b>Interviews</b>	<b>Venue</b>
1	Technical officer		1	SAO, Nagpur
2	Commission Agents		1	APMC, Nagpur
3	Wholesaler		1	Kalmna market, Nagpur
4	Retailer		1	Reliance fresh, supermarket, Nagpur
Total		36	4	

#### **4.8 Data analysis**

The data that were collected through the field research (survey and interviews) were tabulated and analysed. The information gathered from the survey, interviews and desk study was analysed and evaluated related to the problems of farmers with value shares and constraint in marketing of mandarin chain. The result gained from surveys, interviews and desk study about the organization of the chain, buyer's requirements and chain up gradation and marketing strategies of the chain was interpreted and compared with relevant literature.

After collection of necessary information it was entered into the computer for analysis. The SPSS was used for preparation of the figure's base on the data gathered during survey and interviews. SWOT was carried out to find out Strength, Weakness, Opportunity and Threats of the mandarin value chain. As a basis for the design of new value chain I used the link methodology.

## Chapter 5: Results

This chapter explains the findings of the study that was conducted among the mandarin farmers in Nagpur district following by study area in 6 towns (Katol, Kalmeshwar, Narkher, Saoner, Kamthi and Umred). The study area is considered by an ineffective market system making it difficult for the farmers to access different mandarin markets in Nagpur district. Nagpur mandarin farmers are known by major producers in India but having the APMC market as the only channel for farmers to sell their produce through commission agents leads to a low share for the mandarin farmers.

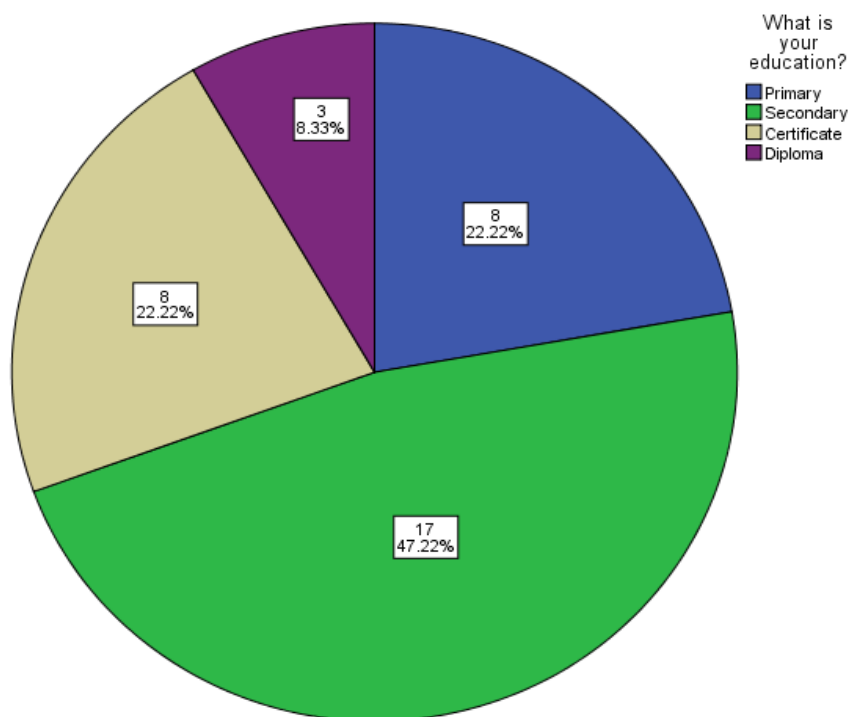
### 5.1 General information

The outcome of my field research indicates that only male farmers are involved in mandarin production. The average age of the mandarin farmers were 52 years it show that they have healthy experience in the mandarin business (table 3). Family members of farmers including wife's used to do cooking, shopping and housekeeping which will indirectly help to the farmers running their farm. Framers also take a help from their wife's and sons to do planting and weeding, other major of the farm work done by farmers with the help of hired labour. (See the annex 5)

**Table 3: Farmers age**

What is your age?		
N	Valid	36
	Missing	0
Mean		51.67

The education level of the farmers ranged from primary school to diploma education in streams like art and commerce. The majority of the farmers (47.22%) had secondary education and (22.22%) farmers had primary education respectively (Figure 6). This indicates that the majority of the mandarin farmers had very low level of education which affects to deal with the modern agriculture techniques and knowledge. Farmers have a successor but they are not interested in farming. It's a tradition in India that, after marriage of farmer's sons and daughters the farm land is divided between them, which leads to plot the getting smaller year after year due to land partition.



**Figure 6: Level of education**

## 5.2 The Stakeholders in mandarin chain

The mandarin market channel in the study area based on the APMC market system, has several actors act for value addition. It starts from the farmers to pre-harvest contractors, commission agents, traders, wholesalers, retailers and consumers. The pre-harvest contractors are hired by the commission agents to collect the mandarins from the farmer's farm and give it to the commission agents. The C.A.s visits the farmer's orchards just before harvesting and sets the price of the mandarin harvest according to quality and quantity. The pre-harvest contractors transport the mandarins to the C.A.s and he gets 1.5% commission per truck from the commission agents. The C.A.s sells to traders and the traders directly sell it to wholesalers or retailers in Nagpur district and also in other states. The retailers sell the mandarin directly to consumers (hotels, restaurants and high income consumer). The small or big vendors and juice centre owners also buy the mandarins from Commission agents in small to moderate quantities and sell it to local consumers (Low and middle income consumer) in small quantities.

The mandarin chain has other actors including the agro-agencies who provide micro nutrients (zinc, copper, manganese, iron, boron and molybdenum) for plant growth, development and

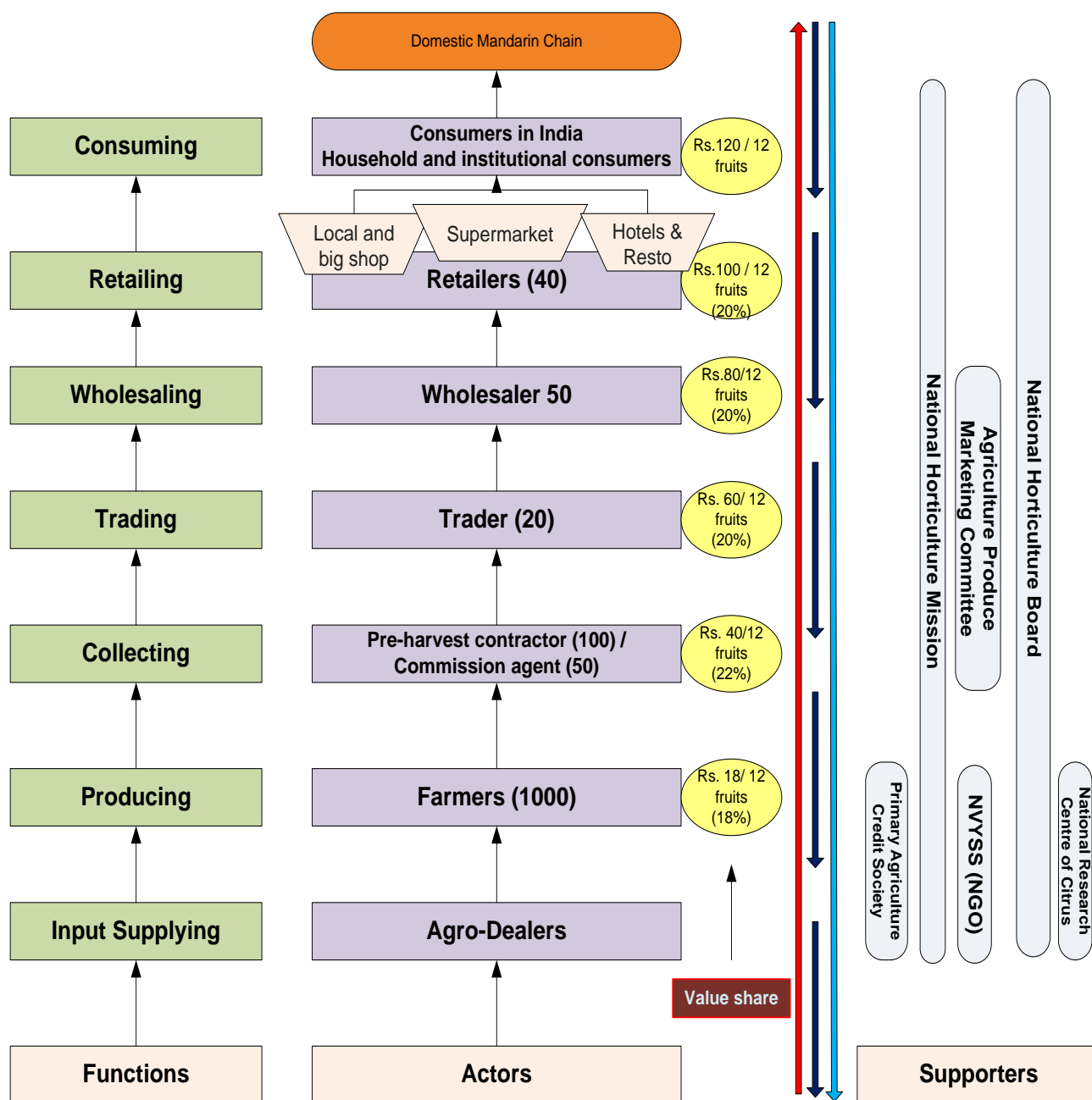
high quality of fruits. Farmyard manure with calcium nitrate and NPK provides for nutritional management. Farm equipments (Sprayer, plough, harrow, trays, drip system and knife), insecticides and pesticides (malathion, carbaryl, phosphomidon, parathion and methyl parathion), while some NGOs, and agriculture institutes provide extension services to the farmers.

Nagpur mandarin bloom twice in a year, the flush that comes in the month of January – February which is called as “Ambia bahar” The fruit from this flush would be available in the month of November – December. The bloom that comes in June to July is called as “Mrig bahar” and this fruit would be available in the months of February to March. This is the beginning of the summer months and therefore there is a high demand, resulting in higher price for these fruits.

Male and female plant of mandarin pollinated naturally, at the flowering stage there is no spray of chemical application by the farmers so flowers attract honey bees naturally.

### **5.3 Existing mandarin chain**

The study reveals that there is only one mandarin supply chain in Nagpur district which currently exists under regulation of the Agriculture Producing Marketing Committee (APMC) for domestic level. The domestic chain is the main supply chain in the Nagpur district where farmers sell their produce through pre-harvest contractors to commission agents at the APMC market (figure 7).



**Figure 7: Existing mandarin chain in Nagpur**

Keys      Money flow ←      Information flow ↔      Product flow →

The study reveals that the current mandarin chain has dominated by APMC market with the influence of commission agents. Farmers were getting only an 18% value share in the whole chain, while commission agents got highest value share 22% (Figure 7). So out of 100% farmers were getting 18% and other actors were getting 82% value share this prices indicates from second flush. It shows that neither the farmers (Rs. 18/12 fruits) nor the consumers (Rs. 120/12 fruits) get access to the right price of mandarin. (NHM, 2008)

## 5.4 Activities of mandarin chain stakeholders

**Table 4: Activities of mandarin chain stakeholders**

<b>Actors</b>	<b>Activities</b>
Farmers	Farmers produce the mandarin in the farms and sell it to pre-harvest contractor.
Agro-agency	They supply manure, farm equipment, insecticide and pesticides to farmers.
Pre-harvest contractors	Pre-harvest contractors collect the mandarin from the farmer's farm and transport to the commission agents at APMC market.
Commission agents	C.A.s collect the mandarins from a pre-harvest contractor and graded according to class A, B, C and D and sells it to traders, small vendors and juice owners.
Traders	They collect mandarins in bulk from C.A.s and sell to wholesalers.
Wholesalers	They sell mandarin to retailers
Retailers	They sell mandarin to all types of consumers
Consumers	The end user of the mandarins.
<b>Supporters/Influencers</b>	
Primary Agriculture Credit Society	Provide credit to the mandarin farmers
National Horticulture Mission	Provide 40% subsidy for rejuvenation of mandarin crop, Provide subsidy for processing plant, cold storage unit and study tour. Provide extension services
National Horticulture Board	Provide 50% subsidy for drip irrigation
NVYSS (NGO)	Provide extension services
NRCC (Research centre)	Provide strengthening on new research on mandarin in Nagpur
APMC	APMC provide market place where farmers sell their produce. APMC have 50 commission agents, 20 traders and 50 wholesalers. APMC provide licences, place for trading and marketing. APMC have contracts with C.A.s and traders for three years, after every three year C.A.s renew the contract with Rs. 600/3year. (APMC 2009)

## 5.5 Planting material

The information received from respondents show that the majority of the farmers have used Rangapur lime rootstock (T-budding) as planting material which was research and approved by National Research Centre of Citrus (NRCC), Nagpur (figure 8) . Average yield of mandarin is 16-18 ton/ha mentioned by farmers. Some progressive farmers produced rootstock by T-budding in their farm and sell it to the other farmers. Farmers were saying they have difficulties to manage nutrition, irrigation and pest management.



**Figure 8: Planting material**

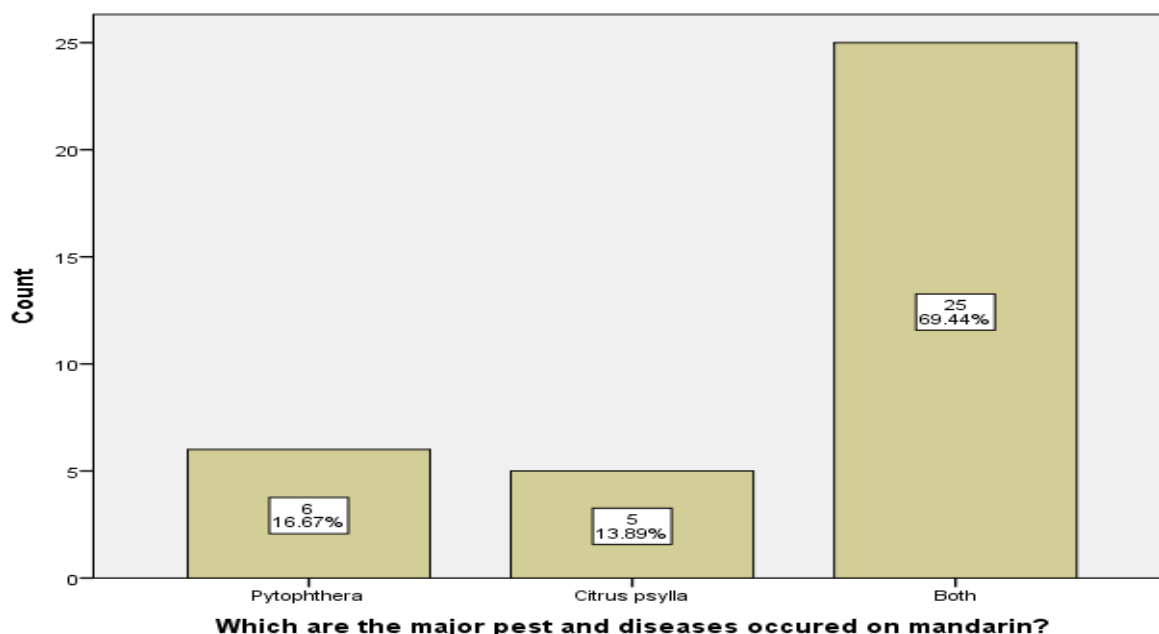
## 5.6 Major pest and diseases

The study reveals that in Nagpur district mandarin farmers have faced heavy infestation of phytophthora and citrus psylla (Figure 9) which is most harmful diseases. 69.44% of the farmers have both diseases on their farm while 16.67% of the farmers have phytophthora attack and 13.89% of the farmers have faced citrus psylla infestation on mandarin which affects the quality and quantity of mandarin (table 5).

**Table 5: Harvest losses by pest and diseases**

Disease/Pest	Losses %	Control measures	Recover %	Total loss %
Phytophthora	20%	Pesticide	5%	15%
Citrus psylla	15%	Insecticide	7%	8%
Both	35%	Both	12%	23%

(NRCC 2013)



**Figure 9: Measure pest and diseases occurred on mandarin**

### 5.7 Control measures

Survey findings shows that the farmers are highly inclined towards chemical insecticides to overcome the disease attack. Figure 10 indicates the majority of the farmers 72.22% spray insecticides, while 16.67% farmers applied IPM practices like( sanitation, vector control, cultural practices, cross protection, vermi compost and neem extract) and 11.11% of the farmers use drenching and spraying method to overcome the heavy attack of Phytophthora and citrus psylla (figure 9).

According to respondents for citrus psylla they spray insecticides like phosphomadin 0.25ml/lit and parathion 0.25ml/lit also application of monocrotophos 0.25ml/lit after every 30 days interval. Chemical spray like ridomil MZ-72 (2.75 gm/lit) and aliette (2.75gm/lit) after every 40 day interval.

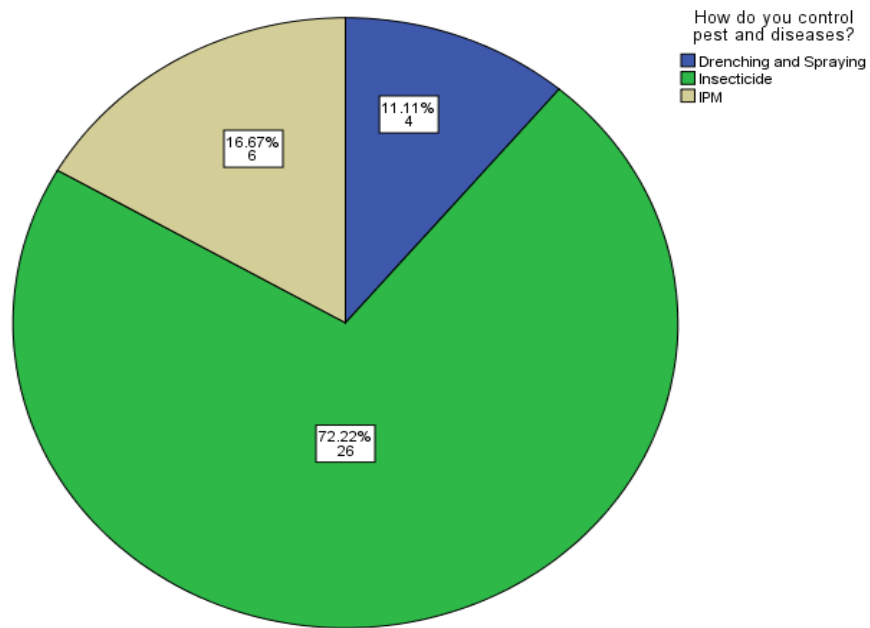


Figure 10: Control measures

### 5.8 Awareness about the quality requirements of mandarins in the market

Figure 11 shows that 66.67% of the farmers don't know about the quality requirement of mandarins in the market, while 33.33% of the farmers said they aware about the quality requirements. They know about the quality requirements in the market like standard size and disease free. It indicated that the majority of the farmers are unknown about the quality requirements in the market.

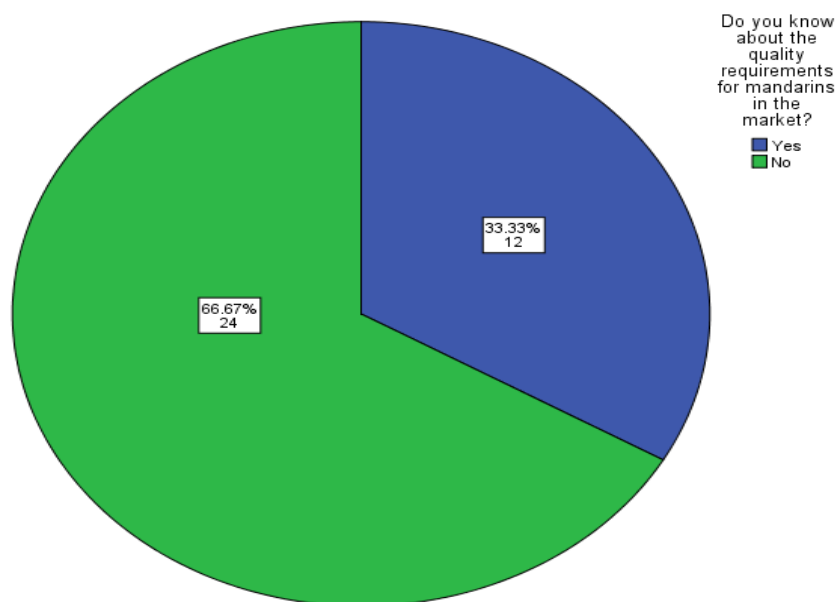


Figure 11: Awareness of quality requirement

## 5.9 Experiment in the farm

Figure 12 reveals that majority 61.11% of the farmers do not experiment on their farm, while 38.89% of the farmers do experiment like (organic drainage, 10 leaf solution, light pruning and raise bed) in their farms. Figure 13 show that the 75% of the farmers are using traditional agricultural practices like (Heavy dose of fertilizers, direct irrigation, hand weeding, excess use of insecticide and hand plucking) in the mandarin farm, while 25% of the farmers believe modern technology (Global gap practices, soil laboratory test, organic farming, organic culture, drip irrigation and post-harvest practices.) in the farm. It indicates that 75 % of the farmers are unknown about the modern technology and its advantages.

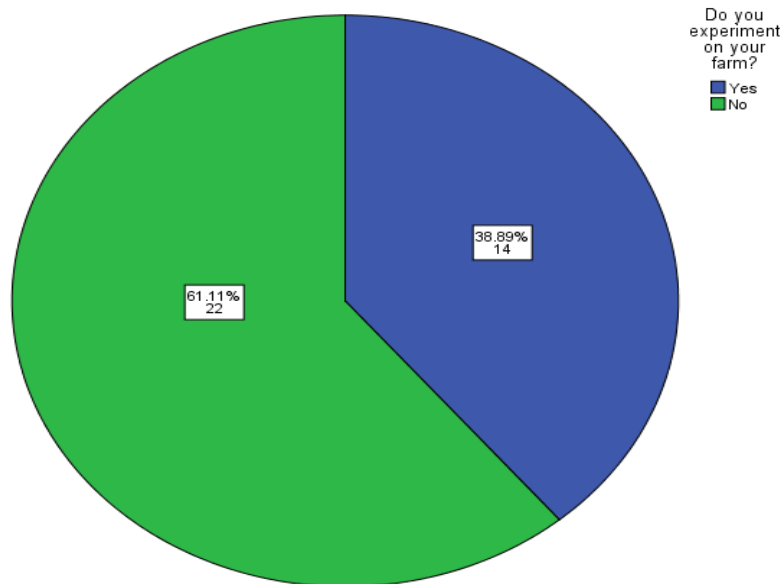


Figure 12: Experiment in the farm

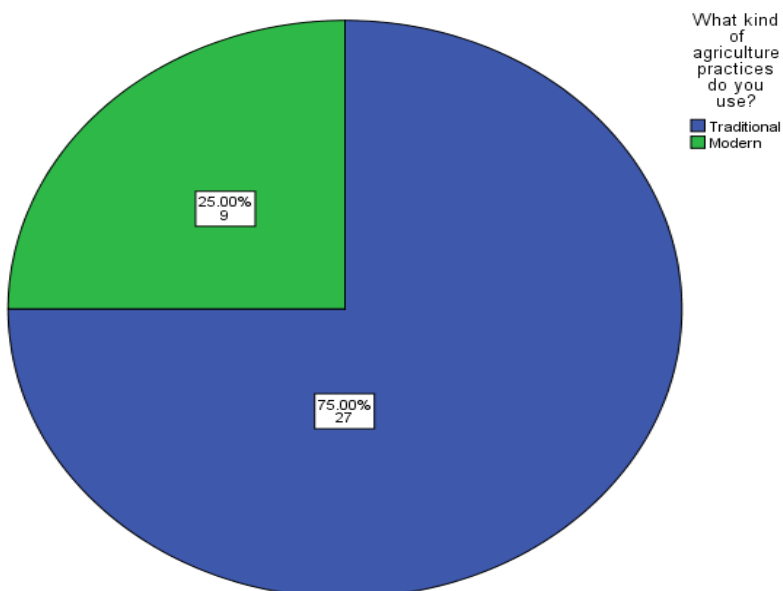


Figure 13: Types if agriculture practices

## 5.10 Harvesting

During the survey ample of farmers said that they sell whole orchard to C.A.s before harvesting. When the maturity stage appears farmers contact with the C.A.s to collect the mandarins. The pre-harvest contractor comes and harvest, collect the mandarins at farm gate and transport to APMC market.

During my survey one farmer shared his bitter experience “**I had tried to sell my mandarins direct to the distant market before two years but the C.A. community threatened me not to do that, this is what our situation in this business is. As a result every farmer sells the whole mandarin orchards to the C.A.s (Figure 14).**” (Farmer)



Figure 14: Interview with farmers

## 5.11 Transportation

Study reveals that pre-harvest contractors transport mandarin from the producer's farm to APMC market by using big trucks as transport vehicle (Figure 15). Trough interview and my observation it was noted that transport costs increases every month in India as diesel prices rise up. In addition to that all 6 mandarin producing towns are away 45 km from the market, while there is no cold van in the district. During transportation the actual temperature in the truck is 30° C to 32° C in Ambia bahar and 40°C to 42° C in Mrig bahar. Transportation is done without grading and packaging. Road infrastructure is quite good but busy traffic delays delivery to market which affects the quality of mandarins. As a result the farmers get lower value shares.



**Figure 15: Transportation**

### 5.12 Grading and packaging

According to farmers grading and packaging is done manually at the APMC market, most of the labour are unskilled and they grade according to grade A, B, C and D. Wooden boxes are being used for packaging but many farmers said that is costly and not good for mandarins (table 6).

**Table 6: Mandarin grade specification**

Grades	Quality specification	Diameter	Markets
Grade A	Semi hard jacket, shiny, rectangular shape, free from pest and diseases, juicy and green to orange color.	"100 – 105" mm	Supermarkets
Grade B	Semi hard jacket, shiny, rectangular shape, free from pest and diseases, juicy and green to orange color	"90 to 95" mm	Supermarkets, hotels and restaurants and distant market
Grade C	Loose jacket, rectangular to round shape, juicy, green in color, slightly mark on surface	"85-90" mm	Local markets and small vendors and juice centers
Grade D	Loose jacket, Loose jacket, rectangular to round shape, juicy, orange in color, slightly mark on surface and slightly pest and disease defect.	"80-85" mm	Street markets and vendors

### 5.13 Storage

There is no cold storage unit near 100 km from the 6 mandarin producing towns. Even at APMC market the C.A.s sells mandarin on the spot to traders and wholesalers. If some quantities of mandarin are left in the market the C.A.s keeps them as it is in the open field.

### 5.14 Mandarin buyer

Figure 16 show that majority 77.78% of the farmers sell their mandarins through pre-harvest contractors to C.A.s, while 22.22% of the farmers sell mandarins to local traders in the APMC market, Nagpur district. The pre-harvest contractors collect mandarin at farmer's farm after harvesting and transport to C.A.s. Local traders have their own shops inside town.

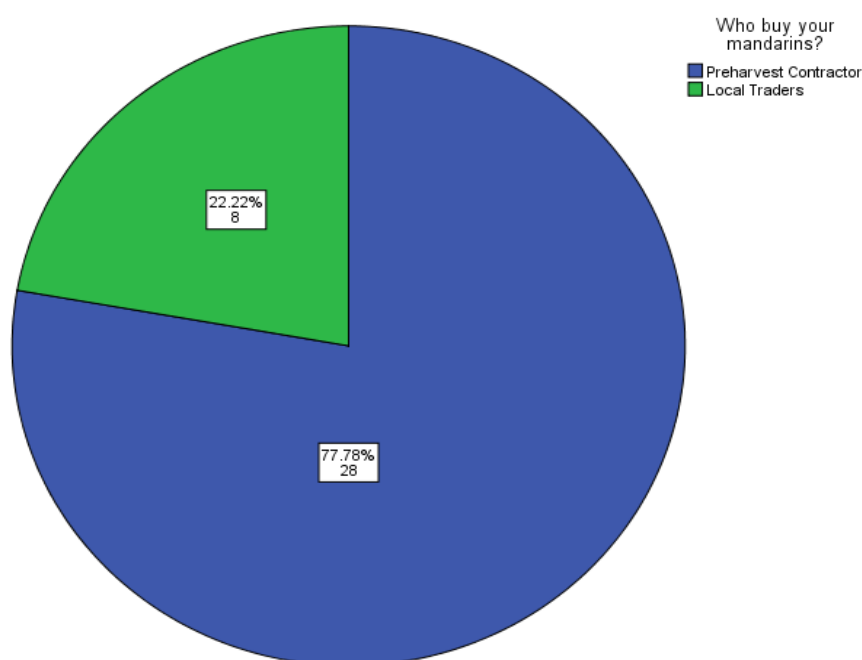
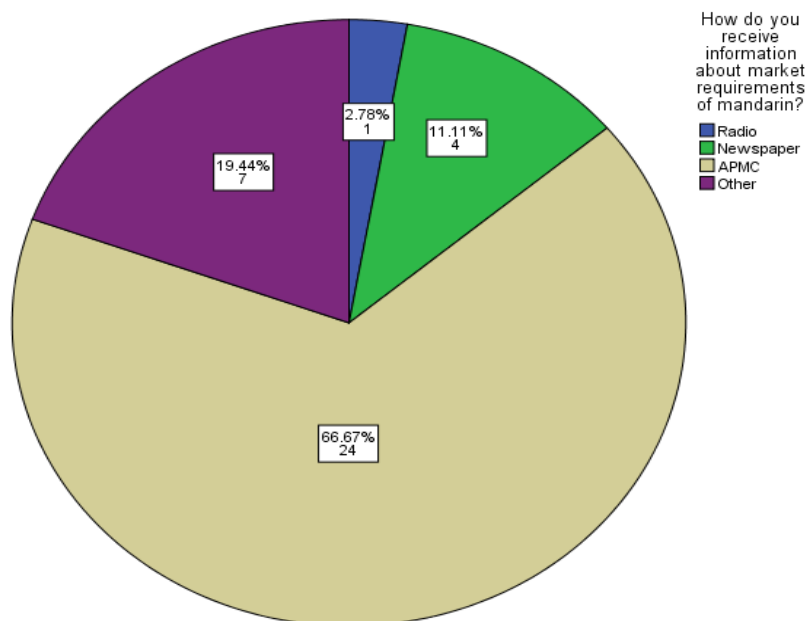


Figure 16: Mandarin buyers

### 5.15 Marketing

#### 5.15.1 Source of market Information

The findings obtained from the survey indicates that 66.67% of the mandarin farmers got market information from APMC market, while 19.44% of the farmers mentioned they access information from other source like internet, magazine and other farmers, 11.11% of the farmers got information from daily newspaper and 2.78% of the farmers received market information from radio (figure17). But none of the farmers received any information about the quality of mandarins.



**Figure 17: Source of market information**

### 5.15.2 Value addition

Table 7 Reveals that 77.78 % of the farmers are saying they are not doing any grading as the pre-harvest contractors came and collected the mandarin from farm which directly affects to lower value share for the farmers, while 22.22% of the farmers are doing sorting and grading themselves according shape and size, which gives them a quite good position towards the C.A.s resulting in a moderately higher price than the other farmers who do not do the grading.

**Table 7: Value addition activities**

**What kind of activities you do for creating added value?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Sorting and Grading	8	22.2	22.2	22.2
Nothing at all	28	77.8	77.8	100.0
Total	36	100.0	100.0	

### 5.15.3 Price determination

The mandarin price was determined by the commission agents, according to my findings. 100% farmers said that mandarin prices were set by commission agents who ranged Rs. 1800 to 2000 per 1000 fruits which, is quite low as compared to progressive farmers who sell mandarin direct to C.A.s and who receive Rs. 2200 to 2400 per 1000 fruits. The commission agents set low price because most of the mandarin producing towns are 45 km away and road infrastructure is not that good and also commission agent paid money to pre-harvest contractors (table 8).

**Table 8: Price determination**

#### **Who determine the price of mandarin?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Commission Agents	36	100.0	100.0	100.0

### 5.15.4 Price satisfaction

Figure 18 show that 66.67% of the farmers were very dissatisfied with the price offered by the commission agent, while 25% of the farmers were 'dissatisfied' with the price and 8.33% of the farmers were 'moderately satisfied' because self-sorting and grading. It indicates that the majority (92%) of the producers were not satisfied the price of mandarin that was being offered by the commission agents.



Figure 18: Price satisfaction

#### 5.15.5 Main problem in Mandarin business

The information obtained from the survey shows mandarin farmers face many constraints such as 69.44% of the producers didn't know about different markets and marketing of mandarin, while 25% of the producers faced delayed payment and 5.56% of the farmers had problem caused by high interest of finance (figure19). Majority of the farmers were not technically sound they don't know how to do marketing that's why they sell their mandarin to C.A.s at the APMC market where they faced delayed payment and low value share. During my survey some farmers said after selling their produce at APMC market they have to wait 3 to 4 weeks for payment from C.A.s

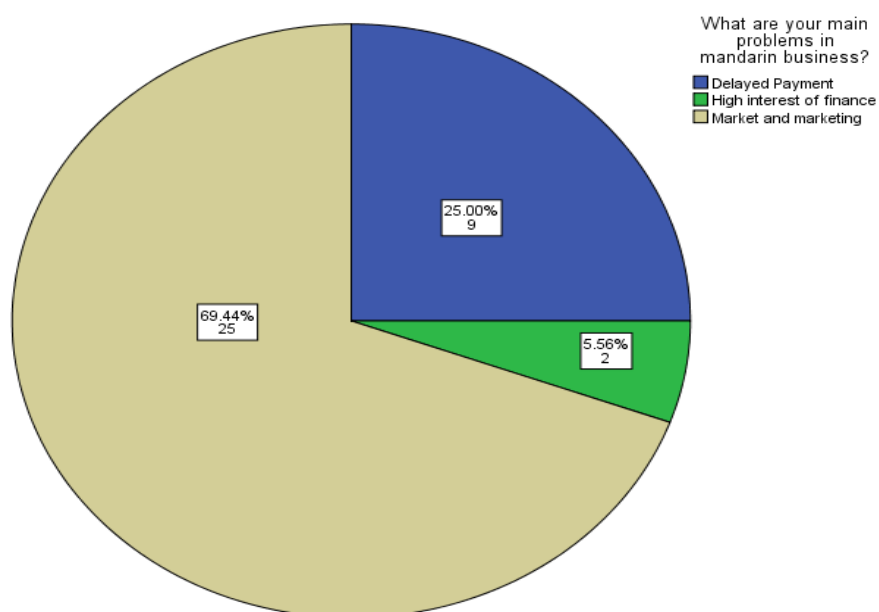


Figure 19: Problems in mandarin business

### 5.16 Extension service provider

Figure 20 Indicate that agriculture government and NGO work as service providing agency in the study area. The majority 63.83% of the producers are not getting any services from the above agency mentioned, while 22.22% of the farmers are getting technical services from the NGO and 13.89% farmers supported by the government. The regularity of the service providers is low from Superintendent district agriculture office (SAO), while the NGO like Nav Vikas Yuva Seva Sanstha (NVYSS) provide technical services in good extent said by farmers. During my survey most of the farmers said that government officers are slothful and failed to provide basic information let alone the technical, quality and market information. 63.89% of the farmers using their sources like other farmer's knowledge and their own tradition agriculture practices.

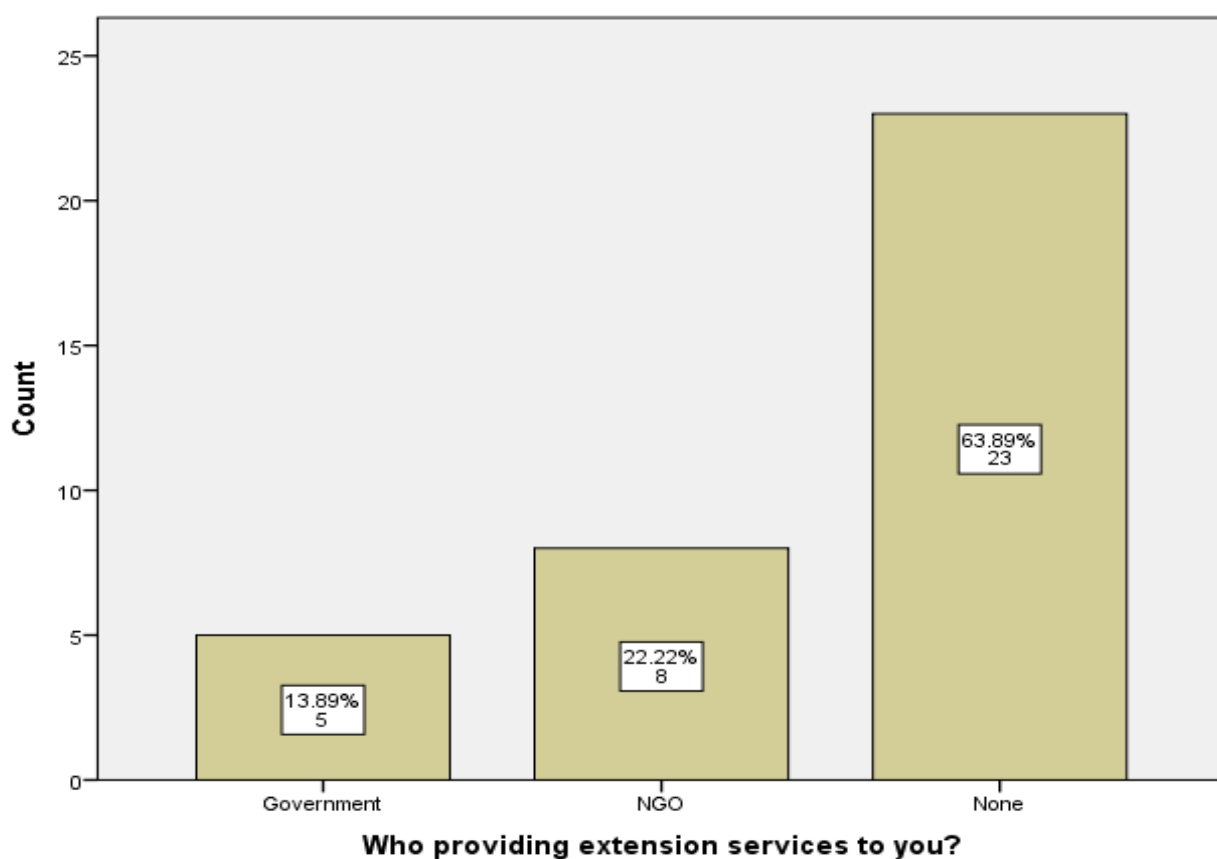


Figure 20: Service provider

## Chapter 6: Results of the interviews

This chapter focused on Interviews with the Commission agent, Wholesaler, retailer and government officer.

### 6.1 Interview with commission agent

The commission agent name was Shekh Pyaru, he has 45 years' experience in the mandarin business as a commission agent at the APMC market in Nagpur. Shekh buys mandarins from the farmers through pre-harvest contractors. He said during peak season 18-20 trucks transport mandarin per day at the APMC market, each truck contain 2-3 tonnes mandarin. Mandarins come from Katol, Narkhed, Kamthi, Umred, kalmeshwar and Saoner. According to the C.A. farmers are not technically sound and they immediately focused on next crop that's why they sell mandarin to C.A. through pre-harvest contractors. He pays Rs. 25000-35000/truck to the farmers and there is no bargaining power to the farmers. C.A. check the quality and condition of the mandarin because mandarins is not graded, packaged and also it comes from more than 45 km. C.A. set the price according to grade A, B, C and D after look at the condition of the mandarins. Quality of mandarins demand start from grade A and B, while grade C and D sell to small vendors and juice centres. Skekh sell 40% of the mandarin to the district vendors, traders, wholesalers and other cities and remaining 60% sell to other states.

**Challenges** – Main challenges to Pyaru are delayed payment from other actors, labour shortage, high charges of loading, unloading and packaging materials, manual operations like grading and packaging.

He said the price offered to the farmers is not paid on time because he sell mandarins to the small and big vendors, traders and wholesalers after grading and packaging at the APMC market. As soon as I get the money from other actors then after I pay to the farmers. Commission agent said," I employed 20 labours for 2 months who are responsible for loading and unloading the truck and each labour get Rs. 6000/month/ labour". Some traders and wholesalers want graded and packaged mandarins and they paid me good money.

According to Shekh," I get 8% commission on one truck of mandarin and I paid 1.5% to the pre-harvest contractors. Transport cost from farm to the APMC market pays by the pre-harvest contractors. I have contract with the APMC market where I paid Rs. 600/3 year for commission licence.

Method of payment should be done on the spot of buying and selling point this is only suggestion to improve mandarin market said Shekh Pyaru (C.A.) Trading is being done on the basis of goodwill in the market with all actors. (Annex 2)

## **6.2 Interview with Wholesaler**

The wholesaler name was Ramesh saxsena who have 30 years experienced in mandarin business as a wholesaler in the Nagpur district. (Annex 3)

### **Present situation of the mandarin marketing channel**

Present situation is not well structured in the mandarin market; the coordination between the actors is weak. I buy mandarin from the traders and C.A.s at the APMC market, sometimes without grading and packaging it's depending on requirements from retailers and hotels.

### **Criteria of mandarin price determination**

Price determination based on quality of mandarin, I usually buy grade A and B which is costly but bargaining power always open for both parties because of my past relationship with traders and C.A.s. I buy 10000 fruits per week from traders and it cost me Rs. 6000/-. And then I sell it in small quantities to different retailers which will give me 20% profit on 10000 fruits.

### **Quality requirement of mandarins**

As I said grade A and B is my first choice to buy, my requirement of mandarin should big in size, semi hard jacket, shiny appearance, free from decay, pest and diseases and color between green orange to pale orange.

### **Challenges in the mandarin marketing according to the wholesaler**

- Costly and inadequate road transport.
- Labor problem, inadequate labor supply during season.
- Packing problem (costly packing material).
- Financial problems (lack of finance) and
- Problems related to the infrastructural facilitates in the market yard.

### **Suggestions for development in the mandarin marketing according to the wholesaler**

- I think C.A.s commission charges should be reduced.
- Farmers should harvest the fruits and graded them in to classes and package it well and sell to the C.A.s or directly to wholesalers and retailers.
- All chain actors should maintain coordination between each other.

### **Information flow among the actors**

Information flow is active for 4 months among the actors. Two month in Ambia bahar and two months in Mrig bahar, this period's mandarin ready to sell. Producers to retailers communicate by phone and exchange information about quantity, quality, price and profit of mandarins.

### **Cost incurred in mandarin chain**

Main cost incurred is transport cost from APMC to my unit, labor cost and packaging cost.

### **Basis of trading**

Trading is done on the basis of contacts and goodwill in the market.

### 6.3 Interview with retailers

I did my third interview with retailer in Nagpur city. He received 1 kg to 5 kg boxes from wholesaler. He has his own supermarket in the city and he sells mandarin to high income consumers. Quantity and quality received by retailers shown below:

**Table 9: Buying and selling cost**

Quantity / week	Quality	Buying cost	Selling cost	Profit
50 boxes of 1 kg	Grade A	Rs. 100/kg	Rs. 120/kg	20%
40 boxes of 2 kg	Grade A	Rs. 100/kg	Rs. 120/kg	20%
40 boxes of 3 kg	Grade B	Rs. 90/kg	Rs. 110/kg	20%
25 boxes of 4 kg	Grade B	Rs. 90/kg	Rs. 110/kg	20%
20 boxes of 5 kg	Grade A	Rs. 100/kg	Rs. 120/kg	20%

#### Constraints faced in the market according to the retailer

Retailers in the local market also have their own problems, the important among them being

- Risk of spoilage of fruits due to their perishable nature.
- Costly transport
- Lack of proper shops / space in the local market to display the fruits.

The improvement suggest by retailer is farmers should sell mandarin to direct to retail shop, and transport cost from farm to retail shop would be divided by both parties, its better thing for farmers, retailers and consumers to get more profit that current scenario.

#### Constraints faced by farmers according to the retailer

According to survey, farmers faced many constraints mention below:

- No market information
- No proper assistance from agriculture officers
- Low market price in the market.
- C.A.s domination in the market that's why no bargaining power for farmers.
- Delayed payment
- Delayed harvesting of oranges
- Breaking contract if the orange prices slash down
- Cut in the payment of farmer in the event of loss of fruit due to dropping.

#### Constraints faced by APMC according to the retailer

- High commission charges.
- High transportation and loading and unloading charges.
- No guarantee of remunerative prices.
- Delayed payment by commission agents.

## 6.4 Interview with the Superintendent of agriculture officer (SAO)

The SAO is the head of Nagpur district agriculture officer. The main activities are providing in the production stage, Taluka agriculture officers work in each town and they are assisting the farmers in the production of mandarins. (Annex 4)

### 1. What is the government support in?

Mandarin production- SAO said that his employee work on providing rootstock (planting material) from agriculture nursery, Schemes like 50% subsidy for drip irrigation through National Horticulture board, 45 % subsidy on rejuvenating dry mandarin plants, 40% subsidy on processing plant also same with the cold storage unit.

All TAO (Town Agriculture Officer) arrange training for the farmers every year for both season in the Nagpur but the problem is farmers are not coming regularly due to transport cost.

### 2. Current measures to assist farmers market their produce?

We organize “Orange festival exhibitions” (Santra Mahatsav) in the Nagpur City, these exhibitions are arranged by the ministry of agriculture for 3 days in a year. Farmers bring their mandarins in the exhibitions and direct sell to the consumers without any intermediate.

### 3. What are the policy governing mandarin farmers?

The government policy is working on strengthening the farmers with new research, innovative technology and GAP practices in order to make the farmers capable to produce quality mandarins and get healthy profit. But the problem is these all new information is not transfer at grass root level. It's time to apply organic farming and GAP practices in the farm but the farmers still stick with traditional way of farming. It's time to educate the farmers first with the help of demonstration, training, expert's visit and meeting.

### 4. Suggestion to improve mandarin marketing?

Well the current chain relationship is weak because there is no transparency and every actor work individually. First of all the farmers should form a group of 10 farmers and divide the tasks between them. **Who does what?** Before the season two farmers search and assure the market first, contracts with buyers about the quality and quantity of mandarins. Two farmers should work on nursery to planting; two farmers should look after nutritional and irrigation management, other two should take care of harvesting and grading and two farmers manage transport and marketing deal. These all efforts help them capable to do self-marketing and get healthy profit.

## Chapter 7 Discussion

This chapter focus on discussion and comparing the findings of results from the desk study, survey and interviews compared with literature review. This chapter includes different section of value chain analysis, marketing channel, mandarin quality requirements for high price market, marketing of mandarin, how mandarin farmers get healthy value share in Nagpur district and SWOT analysis.

### 7.1 Value chain analysis of mandarin and present marketing channel

From the findings, it seems that there were 6 (producing-collecting-trading-wholesaling-retailing and consuming) but the domestic chain is dysfunctional. Because the biggest challenge problem identified at producing mandarins is poor coordination among the farmers and chain actors. In the current mandarin business farmers are getting low value share, the mandarin quality upgrading is essential to upgrade the chain to make it more competitive and sustainable and find the other alternative market channels in Nagpur district. Farmers are currently selling their mandarin to C.A.s at the APCM market through pre-harvest contractors which is completely reducing price bargaining power of the farmers. The largest amount of mandarin produces in Nagpur district, the function of the actors that were identified from research. The farmers only men mainly involved in mandarin business. The pre-harvest contractors harvest and collect the mandarins from farm and transport to commission agent at APMC market where traders buy the mandarins from C.A.s and transport it to wholesalers after grading and packaging according to requirement of wholesaler and retailers after this trade wholesalers and retailers sell mandarins in small quantities to consumers.

The result further indicates that majority 92% of the farmers were not satisfied with the current price that was being offered by C.A. (Figure 18). Farmers have no choice to sell and satisfied with the price because if farmers argue about price C.A. refuses to buy the mandarin and move to next farmer's farm. According to Bhole (2004) in Nagpur district pre-harvest contractors dictate the price of mandarin which is mainly determined by commission agent. There is no transparency between the chains actors that's the reason farmers never come know to what the real price their mandarin sells to other chain actors from C.A.s Every actor engaged in the mandarin business for their own profit.

The chain up gradation is the only possible way to strengthening the mandarin business when the farmers are aware about product quality and its management practices during the supply. They lack technical knowledge and the traditional way of practicing makes that the farmers are not conscious about the quality of the product. The mandarin business is all depends on improvements by the farmer's otherwise, the mandarin chain will never functioning well. So it is necessary to install processing (grading and packaging) and cold storage unit at town place, which will help the farmers to do appropriate grading, packaging and increase the shelf life in the cold storage which will give them higher price. It should be installed by 15-20 farmers as a

group. Nvyss (NGO) organises trainings and demonstration to the producer level to improve the quality of mandarin.

Based on the results of my research, only government of agriculture (SDAO) and Nvyss (NGO) are working as supporter especially in extension services and other supporters like ATMA. NRCC, NHB and NRCC are also support on a specific area in the mandarin chain. The role of the supporter play vital role to upgrade the chain to enhancing product quality and invent different market channels. 63.89% of the producers do not receive any extension services from supporters (figure 20) that lead to them practicing the traditional way of farming like close planting, production without training and pruning, high doses of chemical fertilizers and insecticides and no post-harvest activities. It is crucial to change traditional practices of farming and marketing into modern way of practise such as avoid deep ploughing to manage natural micronutrient in the soil because natural micro nutrients are burn in high temperature, apply recommended planting distance, use organic practices and integrated pest management, standard grading and packaging. It is the possible when the farmers are aware about the modern techniques of farming and marketing and different marketing channels to enhance the quality and healthy profit for farmers.

## **7.2 Mandarin production and value share**

From the finding from the surveys farmers produced mandarins 15-18 ton/ha and the cost of cultivation for 1 ha is Rs. 3677000 rupees and farmers get Rs. 550000 rupees/ ha in 1 season (DOAC, 2008) but mandarin is require first 5 years to mature and from start of 6 year mandarins fruit become ready for harvest (Annex 6). The value share for farmer is 18% (figure 7) but the net profit is 4% for the farmers/12 fruits. Net profit is 4% is low as compared to Turkey and Spain (DOMI 2009).

## **7.3 Present knowledge and information of farmers for production of mandarin**

From the surveys 100% of the farmers using rangapur lime rootstock (t-budding) for planting which approved and research by NRCC and it's very efficient (figure 8). But the big challenges for farmers are handling of pre-harvest, post-harvest operation and marketing of mandarins. The result from the survey shows that 75 % of the farmers still doing traditional way of farming (figure 13) like close planting, application heavy doses of fertilizers, and application of chemical insecticides for overcome the disease and pest, 72.22% of the farmers sprays chemical to control phytophthora and citrus psylla (figure 10). Due to the heavy attack of phytophthora and citrus psylla farmers loss 35 % their mandarin harvest (table 5) which is leads to low quality of produce and subsequently effect on low profit to the farmers.

First and foremost farmers need primary training at production level. Modern technology like global gap, organic farming, integrated pest management, standard grading and packaging should organise at farmer's level. The first priority of Nvyss to register interested farmers with the NGO and organise training two months before the planting season of mandarin to make sure farmers understand and implement the proper and recommended practice in their farms in

order to produce quality product and get maximum profit. The trainings like application of global gap practices, organic farming, IPM, neem extract application is good solution for pest and diseases, herbal pest like kamdhenu herb is approved to recover the phytophthora disease, training and pruning, nutrition and irrigation management. NVYSS will have to arrange expert meetings with the farmers who have an ample insight and mastery at production level and marketing level. NVYSS install free apps for farmers, retailers and consumers where they can easily come to know about the current market price and quality requirement of mandarins. After planting season start NGOs 12 extension workers visit 6 towns of mandarin where two extension workers divided in to 6 towns. These extension workers are going to supervise farmers about the pre-harvest operations.

#### **7.4 Mandarin quality requirements of buyer**

Findings from the survey 66.67% of the farmers are not aware about mandarin quality required in the market (figure 11). According to Bhole (2004) majority of the farmers sell their mandarin to pre-harvest community and my observation from survey reveals' 77.76% of the farmers sell their mandarin to pre-harvest contractor (figure 19). It proves that farmers don't know about the quality requirement of mandarin in the market. In addition to that value addition activities like grading, packaging, storage and transport is not done by 77.80% of the district farmers (table 6).

##### **7.4.1 Grading**

According to DOMI (2009) grading is one of the most important procedure to be followed in post-harvest handling, as it determines the quality, shelf life and price of the products. During grading mandarin sorted to fix standard grades like grade A require rectangular colour, 100-105 mm diameter, free from pest and disease, semi hard jacket, green to orange in colour. Grade B is the same quality requirement only the diameter is 90-95 mm and grade C 85-90mm. The NRCC developed grading machine in Nagpur but the distance from the 6 town is more than 50 Km so its better farmers group should develop and install the grading unit in their respective town with the help of government subsidy and NVYSS technical support. Though there is no grading mandarin at producers level, but there is an increasing reorganisation to the fact that producer need to be assisted in grading before sale because grading help to increase marketing efficiency by facilitating buying and selling a produce without personal selection, grading set and enhance good price for graded mandarin, marketing cost in packaging can be avoided by grading and there is fairness to both buyers and sellers so that they will get better price (DOMI 2009).

### **7.4.2 Packaging**

The packaging of fruits is required for efficient handling and marketing, better eye appeal and better shelf life by reducing mechanical damage and water loss is one of the most important requirements of buyers in the market. Farmers can easily use traditional baskets, sacks, boxes and trays to carry the produce to the market as packaging material. These materials are locally fabricated, low cost and made out of cane and bamboo is very efficient in domestic market.

According to survey producers are not aware about the grading, packaging and storage requirement of the domestic market. It is essential to supply the products as the buyer's requirements to obtain high market prices as well as create opportunities and expand the production.

Packaging is very important and essential aim to protect the produce from damage in handling, transport and storage and to provide easily packing in uniform size. Economy in packing is always desirable goal. Local labour and fabricated packing material easily available in the town place at moderate price.

The training and workshop are very helpful to enlighten and encourage the producers about advantages of quality management and requirement to supply in the market. This will directly jump to increase price of product as well as the income level of farmers. So support foundation NUYSS has to support to enlighten the farmers about quality requirement of mandarin and implement in the next season through training and demonstration activities and by workshops and experts meeting.

### **7.4.3 Storage**

The production of the fruit is seasonal, but its demand remains for a longer period, therefore storage is very essential for extending the consumption of fruits, as well as for regulating their supply to the markets. The main aim of storage is to ensure better return to the growers.

According to DOMI (2009) the ideal temperature and relative humidity is 40-45° F and 85 % humidity for the mandarin storage. In this condition mandarin can be stored for 4-6 week in profitable state. Improper storage can be caused shrivelling of surface, weight loss and infection of disease.

APMC have cold storage facilities but it too costly for the farmers because of the commission agents and traders domination in the market and they are also deal with other perishable horticultural commodities. So the establishment of appropriate cold storage, which have proper storage system with technical expert, will help to improve the quality of mandarin that will be given healthy price in the domestic market for farmers.

Exclude the cold storage in the APMC; there is no cold storage facilities exist in Nagpur district. Keeping mandarin in cold storage be able to reduce the loss of reduce the post-harvest loss and maintain the quality of mandarin for longer period. Cold storage facilities will help the farmers to sell the mandarin to distant markets in other states which requires more shelf life than local markets so distance market can be an opportunity to for the district mandarin farmers to get good price.

## **7.5 Chain up gradation**

According to Bhole (2004) most commonly followed methods of sale of oranges in the study area were (i) selling fruits to the pre-harvest contractor and (ii) selling fruits in the Agricultural Produce market committees. It was observed that 79 per cent farmers sold their produce to the pre-harvest contractor while 21 per cent farmers sold the produce in the APMC. No farmer sold his produce directly in the distant market. The finding from survey and interviews this whole scenario change in 10 years, farmers sells their produce to the C.A.s through pre-harvest contractors. The research reveals that currently majority 77.78% of the farmers sell their produce through pre-harvest contractor to Commission agent (figure 16).

The chain upgrading is only possible only possible when produces aware process and product quality management during the supply. The role of supporters is very crucial to upgrade the chain through the upgrading product quality in the chain. The current international knowledge, competency, response from the producers and NVYSS team, I would like to organise three possible chains in Nagpur districts.

- The first supply chain is chain producers directly sell the mandarins to retailers with the help of NVYSS (NGO), 50 supermarkets exist in Nagpur district.
- The second supply chain is producer's direct sell their produce to housing societies and apartments, these societies and apartments have to give space for shop where the farmers bring their mandarin according to society family's requirement and sell them directly without any intermediate.
- The third supply chain is the farmers can sells their mandarins to fruit juice centre, In Nagpur more than 1000 fruit centre is exist and they buy mandarins from wholesalers and traders which is costly for juice centres. Nagpur consumer group is highly juice conscious, especially in summer when temperature goes 40° to 48° C (February to July), farmers sell their produce according to quality requirements of possible mandarin buyers.

These three chains will help farmers to aware about quality and quality management and marketing the mandarin which will give them healthy profit. This is the best possible value chain up gradation for mandarin which will be helpful towards the improvement of mandarin business and satisfaction for the producer and consumer.

In these 3 chains NVYSS (NGO) will work as a network facilitator or convenor as well as supporters, the other chain actors will be agro agencies, retailers, housing societies, juice centre

owners and consumers. Supporters are superintendent of Agriculture Office (SAO), Agriculture technical management agency (ATMA), National Horticulture Board (NHB), National Horticulture Mission (NHM), National Research Centre of Citrus (NRCC) and Primary agriculture Credit Society.

## **7.6 Steps of NVYSS to help mandarin farmers to get healthy value share**

Nav Vikas Yuva Seva Sanstha (NGO) has to recognise innovative and interested mandarin farmers which are eager to contract with the NGO. After this task NVYSS going to open a free web mandarin apps for farmers, where registered farmers, retailers and consumers come to know the different grade quality of mandarin, price of mandarin, buyer requirements, quantity, packaging, traceability for three chains. This mandarin app will update current and future orders, quality, quantity and requirement of mandarins from the retailers, housing societies, juice centre owners and other consumers to the mandarin producers. The mandarin apps initial cost would be Rs. 15000/year and other staff already working with NGO with respective salaries. Every actor will be registered online with the mandarin apps from their own account, it will facilitate full transparency between among the actors and that will help to strengthening mandarin chains for longer periods.

Farmers have to renew the contracts every year with rupees 2000 (€ 25/year), NGO extension worker and other experts will arrange organic farming and global gap practices session before two months of plantation in order to farmers understand and implement at proper stage and proper time in order to produce quality mandarins. At the time of planting extension workers assist the farmers starting from global gap practices, organic farming, manure application, planting ration, nutrition management, and irrigation management. Integrated pest management workshop and demonstration will be organise at each town in order to farmers apply organic spray like neem extract, herbal kamdhenu pest to control pest and diseases which will improve quality of production and productivity of mandarin. NVYSS will form a 10-15 farmers group at each town **(Who does what?)** to make them educated, active, independent and innovative farmers this approach will be helpful to increase coordination between farmers. These farmers groups have to install processing and cold storage unit with the help of SAO and ATMA government institute with 40 % subsidy and other 60% pay by farmer groups and NVYSS experts will provide technical supports in grading, packaging and storage operations. Farmer's community should organise mandarin festival for 8-10 day per season in Nagpur districts with help of agriculture government, where farmers bring their mandarins in to the stall and directly sell it to consumers.

At the time of harvesting farmers will harvest their mandarin with the help of trained labour and graded them according to grade A, B, C and D , after grading packaging will be done in the plastic baskets, corrugated boxes and plastic bags, these all activities will be done in the front of extension workers.

As I have mentioned earlier all 6 towns 45 km away from the Nagpur city, so transport will be by small trucks, at the time of loading unloading precaution will be taken by my labours.

During the interview with the retailer, he said that farmers should supply mandarin directly to retailers.

This signifies farmers are not that much technically sound for marketing and dealing with the retailers. So with help of NVYSS I will contact with 50 food managers who are working in the supermarkets in Nagpur and arrange the meeting with them in order to know the seasonal quality requirement, quantity, packaging requirement for each retailer in their respective supermarkets, retailers also send an enquiry to mandarin apps. According to quality, quantity and packaging NVYSS will assist the farmers to produce quality mandarin, graded and packaged according to buyer requirements.

In the second chain NVYSS is able to contract with 7 housing societies where society secretaries are ready to give a free space for four months/2 season where farmers bring their produce and sell fresh mandarin directly to housing society consumer at low rate as compared to market rate without any middleman. In summer season temperature is always high therefore society members don't go to do shopping in the market so they can easily buy quality mandarin directly from their society shop in moderate cost without spending time and transport cost. During my field study I introduced with 7 housing societies in the Nagpur district, where I discussed and convinced about the new mandarin chain and future strategies with secretary of the societies and they are happy to support and give a free space for shop in their societies where farmers directly sell their mandarin to society consumers.

In the third chain NVYSS directly registers all juice canterers to mandarin apps and they can also send enquiry on daily basis for mandarin requirements. NVYSS can also provide the employment for agriculture graduate student to work for mandarin value chain to manage the office and field work.

## 7.7 SWOT analysis

The strength, weakness, opportunities and threats (SWOT) tool has been identified during the study of mandarin chain is mentioned in table 8. The strengths of the mandarin supply chain are at farmers level; the weaknesses of the chain in quality management and marketing of mandarin during whole chain; the opportunities are for strengthening the new market channels of mandarin and the threats to manage natural calamity.

**Table 10: SWOT analysis**

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"> <li>• High consumer demand</li> <li>• Availability of land</li> <li>• Availability of inputs (planting material, manure, and fertilizers)</li> <li>• Technical information available from NVYSS and Gov. Officers.</li> <li>• High nutritional value (Vitamin C, A, E, and K)</li> <li>• Labours available at moderate price</li> <li>• Market is available at district level</li> <li>• More profitable than other horticultural crops</li> <li>• Good road infrastructure</li> <li>• Subsidy available for drip irrigation, processing and cold storage plant</li> <li>• Good research is doing by NRCC</li> </ul>	<ul style="list-style-type: none"> <li>• Unskilled labour</li> <li>• Absence of post-harvest technology</li> <li>• Delayed payment from C.A.</li> <li>• No coordination and transparency among the stakeholders</li> <li>• Lack of cold storage and processing unit</li> <li>• Inadequate technical support from agriculture officers.</li> <li>• Load shading ( electric supply)</li> <li>• Absence of technical experts</li> <li>• Growers are not organise in to groups for work</li> <li>• Producers don't have quality management and technical knowledge</li> <li>• APMC has C.A. domination</li> <li>• No bargaining power at farmers level</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Introduction of modern technology</li> <li>• Export potential of mandarin to Asian and European market.</li> <li>• Potential to increase productivity and production area</li> <li>• Increase more employment opportunities</li> <li>• High market demands in other states of India</li> <li>• Scope for introduce new market channels in the district</li> </ul>	<ul style="list-style-type: none"> <li>• High incidence of disease and pest and control is expensive</li> <li>• High rainfall and drought during production season</li> <li>• Threats of stealing the fruits</li> <li>• High fluctuation in market price</li> <li>• Government policy is unclear and inadequate and not spread at grass root level</li> </ul>

## Chapter 8: Conclusions and recommendations

### 8.1 Conclusions

The goal of the study was to discover the constraints faced by the farmers in the mandarin supply chain which are affecting to get profitable value share for farmers in Nagpur district

In Nagpur district the mandarin chain is marketed by only one chain i.e. APMC which is run by 7 links: producers-pre-harvest contractors-commission agents- traders-wholesalers-retailers-consumers. There are no cold storage facilities and processing plant, the research shows that every actor in the chain graded and packaged mandarins manually. Farmers are not technically sound that's why they sell mandarin through pre-harvest contractors to the C.A.s. farmers are not working as group as a result bargaining power of price held by the C.A.s. Due to this other chain actors took advantage of this condition that leads to low profit for the farmers. In addition, the inadequate support service from agriculture officers, limited extension services for limited farmers and weak relationship that existed among the actors in the mandarin supply chain.

- Stakeholders working in this chain are input suppliers, mandarin growers, pre-harvest contractors, C.A.s, traders, wholesalers, retailers, and consumers.
- The supporters are NHM, NHB, NRCC, APMC, NVYSS (NGO) and PACS working in current mandarin chain.
- Farmers are using traditional way of farming such as heavy application of fertilizers, chemical spray and close planting which is effect on mandarin quality.
- Lacking awareness about harvesting the crop and ignorant about pre-harvest practices such as grading, packaging, storage and transport which are directly leads to low profit share for farmers.
- Missing consciousness about quality management, quality requirement in the market and marketing of mandarin are most crucial factors affecting low profit at producer level.

The farmers should be aware about the quality management, market requirements and market price and different channels during the production to supply in the market so they can get healthy price. But the main problem is absence of technical knowledge about production in farm to supply in the market. It is necessary to make them educate and train about all activities with the help of organising training and workshop.

From this research, finally we can conclude that the main reasons affecting low value share for farmers are traditional farming at production level, dependant on pre-harvest contractors, no bargaining power, lacking awareness about quality management, lack of technical knowledge about grading and packaging, limited extension services from supporters, C.A.s domination in the market, lack of cold storage and processing facilities, weak chain relationship with other chain actors and only one market outlet. That leads to mandarin producers not able to get healthy price in the domestic market.

## **8.2 Recommendations**

### **Recommendations to the Farmers**

- The farmers need to follow group approach to marketing and contract farming in production.
- The farmers have to do harvesting, grading, packaging and transport of their produce to market.
- Farmers need to follow organic approach and new agriculture techniques.
- Farmers need to manage quality management, requirements of the buyers and marketing which can possible to contract with NVYSS for better future.
- The Producers-NGO-retailers-Consumer, Producers-NGO-housing society consumers and producers-NGO-fruit centre owners-consumers marketing channels would be the ideal choice for mandarin farmers to it will help to fetch healthy price.

### **Recommendations to the NVYSS (NGO)**

- NGO need to install mandarin apps and contract with interested farmers.
- NVYSS should provide trainings on production technology, post-harvest technology as well as different marketing channels which are important to the farmers to aware and understand production and supply chain of mandarin with the help of mandarin app.
- NVYSS need to contract with retailers, housing societies and juice centre owners for strong linkage between all the actors in the new chain.
- NVYSS need to assist the farmers in formation of united marketing groups.
- NVYSS have to facilitating internal marketing such as information on quality produce, source of supply, volume of transaction, quality requirement and weekly price trend should be made through mandarin apps and mass media, so as to bridge the information gap between producers and traders.

### **Recommendation to retailers**

- Retailers need to take initiative to buy mandarin directly from the farmers.
- Retailers have to maintain storage facility in the shop in order to maintain proper quality during supply.
- Retailers need to inform farmers about desired quality and quantity requirements during both season and transport cost has to be shared by both parties.

## **Recommendations to the government**

- The agriculture government agencies like NHB, NHM and NRCC should develop physical infrastructure like processing plant, cold storage unit at town place.
- The NRCC must have to enhance research and extension to increase quality. Appropriate research is the key to upgrading quality. A strong public research programme is needed on efficient method of farming.
- The NHM and NHB should facilitate subsidise scheme at grass root level. Agriculture officers should be train themselves to implement new technology and subsidies which came through ministry of horticulture before assist the farmers.
- The linkage between agriculture institute and farmers need to be enhanced, the NHM cannot assemble the processing plant and cold storage unit alone it need big investment fund so It requires collective action including government agencies, NGO and other organisations to take initiative to develop and implement these facilities.
- Government may need to develop market centres and infrastructure in strategic location, but importantly, the government should work with the private sector to find out how such centres can be developed in partnership with them. This is about making private investment attractive without subsidies. This also requires an early enactment of the proposed marketing act.
- A strong linkage must to be developed, established and nurtured among the production, research, marketing and industry departments of state government to consider as an enterprise.
- As strong research based centres need to be developed from the existing district horticulture research organisation to tackle day to day problem and offer the solution to the mandarin growers.

### 8.3 Link Methodology

Linking smallholders with modern markets is not only a matter of strengthening farmers and capacities to become better business partners. But also requires the private sector to adjust its business practices to smallholder's needs and conditions to stimulate sustainable trading relationships (CIAT 2013).

#### 8.3.1 New mandarin chains in the Nagpur district

I am using the link methodology as tool to invent three possible mandarin chains in Nagpur district. Which include a value chain map and business model canvas, a set of indicative new business principles to evaluate and design business model. The approaches focus on three dimensions such as capable producers, willing buyers and the enabling environment.

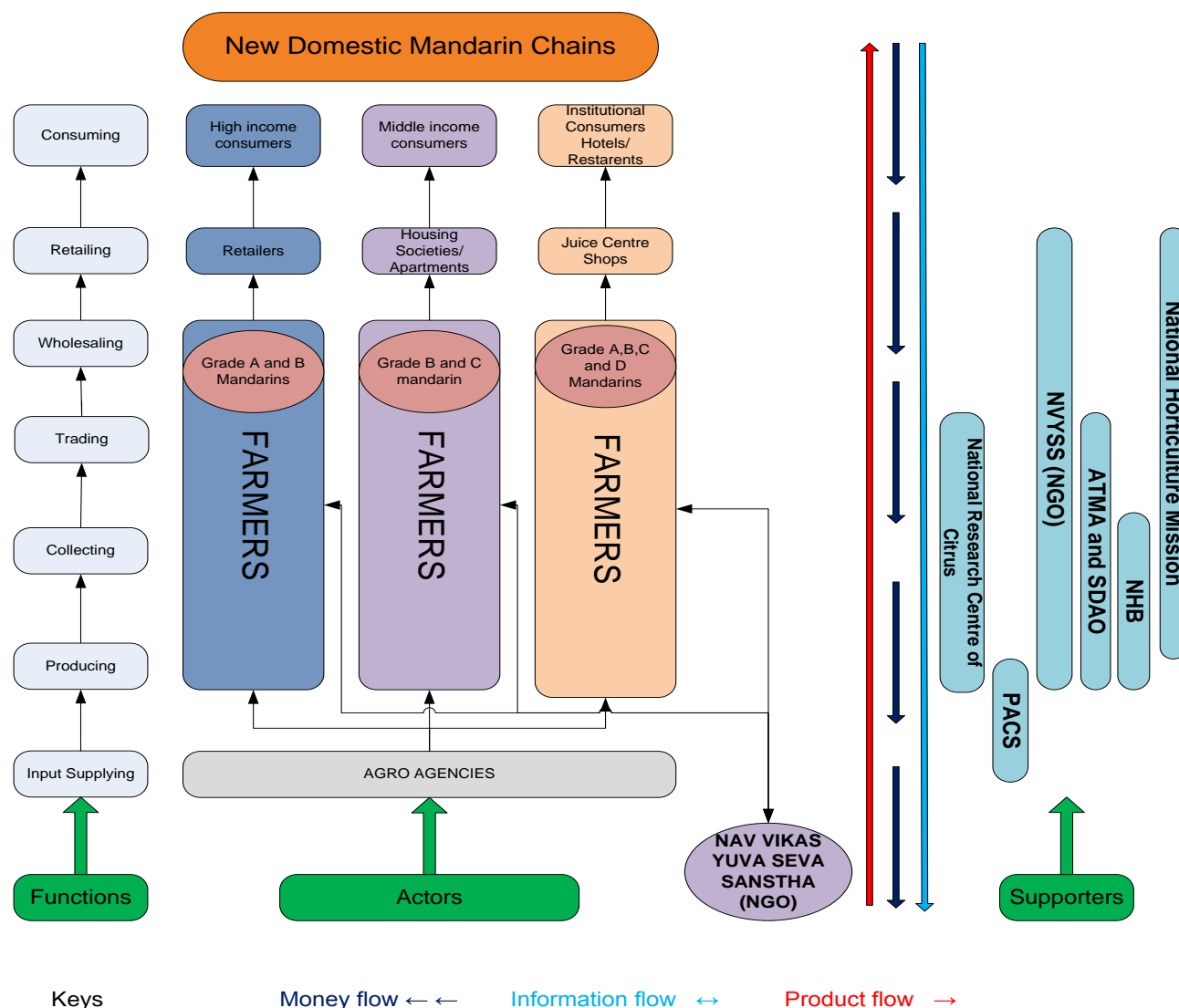


Figure 21: New mandarin chains in Nagpur district

### 8.3.2 Business model canvas for Nagpur mandarins

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
National horticulture board (Ministry of horticulture), National horticulture mission, Superintendent of district agriculture office (Nagpur), Agriculture technical management agency(Nagpur), National research centre of Citrus(Nagpur),	Training, workshop, demonstration, farming, production of mandarin Processing Retailing Marketing	Ideal climatic conditions Rural- Urban integration Taste, Nutritional value Vitamin A, K, E D Local brand (Nagpur mandarin)	Rural-Urban bonding Trustworthiness Written agreement Written contracts with farmers Dedicated performance Extension services Internet mandarin apps Magazines News papers	Nagpur habitants High income level consumers Other state tourists Institutional consumers Retailers Housing societies Juice shop owners
Primary Agriculture credit societies (Financial support), Agro agencies (Input supplies)	<b>Key Resource</b> Farming community NVYSS, Availability of land, Local market		<b>Channels</b> Santra mahotsav (Mandarin festival) Dhanya mahotsa (Fruit festival) Harvest events Farm gate shops Open markets Special market Orange sweet Restaurants Hotels Juice centres	
<b>Cost Structure</b> Fixed Costs - electricity, input cost (manure, fertilizers and farm equipments) irrigation cost, harvesting cost, labour cost, grading and packaging cost  Variable costs- transportation cost and market price			<b>Revenue Streams</b> Profits Subsidy for installation of processing plant Subsidy for the cold storage unit Sale of by products Sale mandarin rootstock	

### 8.3.3 Activities and responsibilities

Table 11: Activities and responsibilities of new mandarin chains

Activities	Responsibilities	Duration	Supervision
Training for my colleagues	Project co-ordinator (Bablu Chaudhari)	4 weeks	NVYSS
Install Mandarin apps	NVYSS	2 week	Project Co-ordinator
Registration with farmers	NVYSS	2 weeks	Project Co-ordinator
Meeting with food managers (Supermarkets)	NVYSS and Project Coordinator	1 Week	NVYSS
Meeting with housing societies and Juice centre owners	NVYSS and Project Coordinator	1 Week	NVYSS
Training for farmers (Organic farming, IPM, Nutrition and Irrigation management)	Extension officers (NVYSS)	4 weeks	NVYSS and project Co-ordinators
Plantation	Farmers and extension workers	2 weeks	NVYSS
Nutrition, irrigation management, weeding, pruning and pest and disease control	Farmers, extension workers, experts, Project coordinator, government officers	–	NVYSS
Harvesting, grading and packaging	Farmers, labours, extension workers, block technical manager (ATMA)	–	Project Co-ordinator
Transport to retailers	Farmers and retailers	–	NVYSS
Payment	Retailers	On the spot	NVYSS
Transport to Housing societies	Framers	–	NVYSS
Payment	Housing society members	On the spot	NVYSS
Transport to Juice centres	Farmers	–	NVYSS
Payment	Farmers and Juice centre owners	On the spot	
Mandarin online app provides all information (Production to supply) to farmers, retailers and consumers according to quality and quantity requirements for all 3 chains.			

### **8.3.4 Future strategy for organizing a new value chain**

#### **First Step**

After my research I will come with new value chain that will help to farmer to assess the right and equal value share in mandarin market. I will try to form a group of expertise with colleagues in our organization to share my new knowledge and experiences to analyze and modify existing projects of contract farming for horticultural crops with special focus on ensuring quality aspects of international standards. I shall also train the groups of our farmers, start with one or two group of 10-15 farmers to make them capable in production; post-harvest and supply chain management at global level under our facilitate ion that will help my colleges to advise technical guidance to farmers. With the help of international knowledge & competency from the mandarin research I shall initiate innovative chain processes and projects in our region to uphold business service entrepreneurs on the way to improve value chains.

I will use the knowledge and skills of communication, presentation, participatory decision making, full motivation and team building, acquired in the course of my study to influence internal organizational processes and members towards mainstreaming the value chain development approach. Besides these, there is the need for me to connect with stakeholders within my circle of influence and strengthen my relations with those that it is weak. For this all endeavours my organisation NVYSS (NGO) is ready to give me a full support.

#### **Long strategies**

I will be able to improve our own work situation and provide better services to our farming community in producing and bringing export quality of mandarins in all seasons for international markets. It will help me to develop my organizational capacity in developing efficient mandarin production and supply chains, stakeholder analysis to explore the limitations in its' efficient management, sustainable quality production and management of integrated mandarin crop, carrying out organizational and value chain analysis in entrepreneurship development and formulating appropriate plans of action in own work situation. It will also help me to overall strengthen our organizational capacity to efficiently manage horticultural practices with global GAP for participatory value and market chains with participatory actions for promoting long time exports. My organization will be able to find new opportunities to build confidence among our associated growers with the international market chains through organized group approach.

India as developing country needs human resource of international excellence to understand and manage mandarin production, post-harvest handling and marketing in diversified agro climatic zones and situations of frequent climate changes with faithful linkages among all stakeholders. My international knowledge and competency will help me to deal with introduction of modern technologies & methods to increase sustainability and quality of mandarin production to ensure the quality aspects in mandarin chains. The experiences sharing and inputs from faculties from my research may help our country to analyze its' policies and programs of large scale mandarin production, processing and marketing to link our bulk quality production with the international market chains in near future. It will also accelerate and facilitate joint working with relevant international partners for sustainable global business development in integrated mandarin chains with quality standards. I shall also try to build the strategic associations between the Indo-Holland enterprises to improve production and supply of mandarin products.

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## Annexes

### Annex 1: Questionnaires for farmers

1. What is your name? \_\_\_\_\_
2. What is your age? \_\_\_\_\_  
District \_\_\_\_\_ Town \_\_\_\_\_
3. Educational background  
Never have been to school \_\_\_\_\_ Primary \_\_\_\_\_ Secondary \_\_\_\_\_  
Certificate \_\_\_\_\_ Diploma \_\_\_\_\_
4. What is your land holding size of mandarin?  
a) 1 ha b) 2 Ha c) 3 Ha d) 4 Ha
5. How long have you been farming? \_\_\_\_\_ years
6. How much is yields per season per hectare?  
-----ton/ha.
7. What is the planting material are you using?  
a) Seed b) T-budding c) other \_\_\_\_\_
8. Do you have irrigation facilities?  
a) Yes b) No
9. If, no how do you manage irrigation?  
\_\_\_\_\_
10. Which are the major pest and disease occurred on mandarin?  
\_\_\_\_\_  
\_\_\_\_\_
11. How do you control the pest and diseases of mandarin?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
12. Do you know about the quality requirements for mandarins in the market?  
a) Yes b) No  
If yes How \_\_\_\_\_?  
If no why not \_\_\_\_\_?
13. What precautions measure do you take to ensure the quality of mandarin?
14. How do you receive information about market requirements of mandarin?  
a) Radio b) Newspaper c) APMC d) Commission agents e) others \_\_\_\_\_

15. What kind of agriculture practices do you use?  
a) Traditional b) Modern technology c) GAP
16. Who is providing extension services to you?  
a) Government b) NVYSS (NGO) c) None
17. What kind of advice and services do they provide?  
a) Technical information b) Marketing information c) None
18. Who buy your mandarins?  
a) Commission agents b) Local traders c) Others
19. What kind of activities you do for creating added value?  
a) Sorting b) Grading c) Packing d) Cooling & sorting e)None
20. How do you communicate with the buyers?  
a) By phone b) In the market c) Agent d) Other\_\_\_\_\_
21. Who determine the price of mandarin?  
a) Buyers b) Myself c) Commission agents d) Traders
22. Do you satisfied with the price offered?  
a) Very dissatisfied b) dissatisfied c) moderately satisfied d) satisfied  
Why?

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23. What are your main problems in mandarin business?  
a) Delayed payment b) High interest rate for finance c) Market d)  
Other\_\_\_\_\_

24. What is distance from your farm to APMC market?  
a) 15-25km b) 26-35km c) 36-45km d) above 45km

**Annex 2: Check list for Commission agents**

- Experience in mandarin value chain
- Challenges in doing the mandarin chain
- Quality of mandarin demand
- Cost incurred in getting mandarin to market
- Volume of mandarin purchase
- Method of Payment
- Suggestion for upgrading in mandarin marketing
- Basis of trading

**Annex 3: Check list for Wholesaler and Retailer**

- Present situation of the mandarin marketing channels
- Criteria of mandarin price determination
- Quality requirement of mandarins
- Challenges in mandarin marketing
- Suggestions for development in mandarin marketing
- Information flow among the actors
- Cost incurred in mandarin chain
- Basis of trading

**Annex 4: Check list for government officer**

- What is the government support in?
  - Mandarin production
  - Mandarin quality
  - Mandarin price
  - Mandarin research
- Current measures to assist farmers market their produce?
- What are the policy governing mandarin farmers?
- Suggestion to improve mandarin marketing?
- Programmes to ensure equal share in mandarin chain for farmers?

### Annex 5: List of the Farmers

Sr. No.	Name	Age	Interview date	District	Town
1.	Vitthal Barai	65	19 July 2014	Nagpur	Kamthi
2.	Subhash Sagne	23	19 July 2014	Nagpur	Kamthi
3.	Balas Jayle	56	19 July 2014	Nagpur	Kamthi
4.	Nemchand Shah	60	19 July 2014	Nagpur	Kamthi
5.	Ramesh Tekade	53	19 July 2014	Nagpur	Kamthi
6.	Ashok Ridhorkar	66	19 July 2014	Nagpur	Kamthi
7.	Suresh Ekde	62	20 July 2014	Nagpur	Narkhed
8.	Suresh Tatode	49	20 July 2014	Nagpur	Narkhed
9.	Promod Nirwan	71	20 July 2014	Nagpur	Narkhed
10.	Bharat Dhomale	50	20 July 2014	Nagpur	Narkhed
11.	Kundalik Dudhane	45	20 July 2014	Nagpur	Narkhed
12.	Pradip Ghatkar	54	20 July 2014	Nagpur	Narkhed
13.	Ramesh Jijkar	65	21 July 2014	Nagpur	Kalmeshwar
14.	Prakash Bhadalkar	54	21 July 2014	Nagpur	Kalmeshwar
15.	Omkar Raut	45	21 July 2014	Nagpur	Kalmeshwar
16.	Ganesh Rawte	34	21 July 2014	Nagpur	Kalmeshwar
17.	Vilas Kadu	53	21 July 2014	Nagpur	Kalmeshwar
18.	Yusuph Khan	50	21 July 2014	Nagpur	Kalmeshwar
19.	Mahesh Mahalpe	67	23 July 2014	Nagpur	Katol
20.	Umesh Chaple	63	23 July 2014	Nagpur	Katol
21.	Vinod Jaymatte	46	23 July 2014	Nagpur	Katol
22.	Kisan Phokade	54	23 July 2014	Nagpur	Katol
23.	Pravin Kharde	57	23 July 2014	Nagpur	Katol
24.	Satish Puse	39	23 July 2014	Nagpur	Katol
25.	Pradip Wankhede	56	24 July 2014	Nagpur	Saoner
26.	Ramesh Tekade	47	24 July 2014	Nagpur	Saoner
27.	Tushar Ghatate	65	24 July 2014	Nagpur	Saoner
28.	Baban Belaghe	54	24 July 2014	Nagpur	Saoner
29.	Ramesh Kakde	44	24 July 2014	Nagpur	Saoner
30.	Mangesh Devtale	32	24 July 2014	Nagpur	Saoner
31.	Kishor Gomkale	66	26 July 2014	Nagpur	Umred
32.	Ashok Meher	43	26 July 2014	Nagpur	Umred
33.	Hitesh domle	56	26 July 2014	Nagpur	Umred
34.	Gajanan Balbudhe	43	26 July 2014	Nagpur	Umred
35.	Mangesh Devhate	33	26 July 2014	Nagpur	Umred
36.	Sachin Dudhane	40	26 July 2014	Nagpur	Umred

**Annex6: Cost of project and means of finance****Unit: 1 hectare (Amount in Rs.) (1 Rs. = 0.012 Cents)**

<b>Sr. No.</b>	<b>Component</b>	<b>Proposed Expenditure</b>
<b>1.</b>	<b>Cultivation Expenses</b>	
	i) Cost of planting material	7500
	ii) Manures and fertilizers	17500
	iii) Insecticides and pesticides	10000
	iv) Cost of labour	31250
	v) Others if any (Power)	8700
	<b>Sub total</b>	<b>74950</b>
<b>2.</b>	<b>Irrigation</b>	
	i) Tube- well/submersible pump	45000
	ii) Cost of pipeline	-
	<b>Sub total</b>	<b>45000</b>
<b>3.</b>	Drip irrigation system & including fertigation	63250
	<b>Sub total</b>	<b>63250</b>
<b>4.</b>	<b>Infrastructure</b>	
	i) Storage and pump house	75000
	ii) Labour shed	12500
	iii) Agriculture equipments	12000
	<b>Sub total</b>	<b>99500</b>
<b>5.</b>	<b>Land development</b>	
	i) Land levelling	10000
	ii) Fencing	75000
	<b>Sub total</b>	<b>85000</b>
	<b>Grand Total</b>	<b>367700</b>

(DOAC, 2008)

Annex 7: Pictures with interviewee



Interview with Commission agent





Interview with Wholesaler



APMC market

## Annex 8: Research planning

	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Date	22 <sup>nd</sup> June	29 <sup>th</sup> June	6 <sup>st</sup> July	13 <sup>th</sup> July	20 <sup>th</sup> July	27 <sup>th</sup> July	3 <sup>rd</sup> Aug	10 <sup>th</sup> Aug	17 <sup>th</sup> Aug	24 <sup>th</sup> Aug	31 <sup>st</sup> Aug	7 <sup>th</sup> Sep	14 <sup>th</sup> Sep	25 <sup>th</sup> Sep
Activities															
Introduction and background information		✓													
Literature review		✓	✓												
Research context Methodology				✓											
Preparation of questionnaires				✓											
Checklist for interview				✓											
Go to India					✓										
Conduct survey in Nagpur						✓	✓								
Take interview in Nagpur								✓							
Data analysing and processing into the computer									✓						
Further literature review									✓						
Conclusion and recommendation									✓	✓					
Back to Wageningen											✓				
Edit the report												✓	✓		
Finalise the report													✓	✓	
Thesis submission														✓	
Defence															✓