VALUE CHAIN ANALYSIS OF SOYBEAN – A STUDY IN BIDAR DISTRICT OF KARNATAKA

ASHWINI C. THAMKE

MBAL 6005

DEPARTMENT OF AGRICULTURAL MARKETING, CO-OPERATION AND BUSINESS MANAGEMENT

UNIVERSITY OF AGRICULTURAL SCIENCES

BENGALURU-560 065

2018

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Project Report submitted to the

UNIVERSITY OF AGRICULTURAL SCIENCES, BENGALURU

in partial fulfillment of the requirements for the Degree of

Master of Business Administration

(Agribusiness Management)

BENGALURU NOVEMBER, 2018


Affectionately
dedicated
to my Guide, my
beloved Parents,
my Brother and
my Friends

DEPARTMENT OF AGRICULTURAL MARKETING, CO-OPERATION AND BUSINESS MANAGEMENT UNIVERSITY OF AGRICULTURAL SCIENCES GKVK, BENGALURU – 560 065

CERTIFICATE

This is to certify that the Project Report entitled, "**VALUE CHAIN ANALYSIS OF SOYBEAN – A STUDY IN BIDAR DISTRICT OF KARNATAKA**" submitted by **Ms. ASHWINI C. THAMKE, ID No. MBAL 6005,** in partial fulfilment of the requirements for the degree of **MASTER OF BUSINESS ADMINISTRATION (Agribusiness Management)** to the University of Agricultural Sciences, Bengaluru is a record of *bona-fide* research work done by her during the period of her study in this University, under my guidance and supervision and the project work has not previously formed the basis of the award of any degree, diploma, associateship, fellowship or other similar titles.

Bengaluru
November, 2018

Dr. M.R. GIRISH
Major Advisor

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3. **V. MANJUNATH**

ACKNOWLEDGEMENT

It is my pleasure to glance back and recall the path I travelled during the days of hard work and perseverance. This thesis is the result of two years work during which I have been accompanied, supported and guided by many people. It is my turn to express my deepest sense of gratitude to all of those who directly and indirectly helped me in this endeavour.

With immense pleasure and deep respect, I express my heartfelt gratitude to the Chairperson of my Advisory Committee ***Dr. M.R. Girish,*** *Associate Professor and PG Co-ordinator – M. Sc. (Agricultural Marketing and Co-operation), Department of Agricultural Marketing, Co-operation and Business Management, UAS, GKVK, Bengaluru, for his excellent guidance, constant support, close counselling and valuable suggestions throughout the period of my study. His enthusiasm, interest, concern, perfection and constructive criticism have always aroused my spirits to do more and to achieve greater rights.*

I am overwhelmed with sincere feeling of indebtedness to the Member of the Advisory Committee ***Dr. M.S. Jayaram,*** *Professor, Department of Agricultural Marketing, Co-operation and Business Management, UAS, GKVK, Bengaluru, for his subtle guidance and prodigious help throughout my research period.*

I am immensely thankful to ***Dr. Mamatha Girish,*** *Assistant Professor (Senior Scale), Department of Agricultural Economics, UAS, GKVK, Bengaluru, for her constant encouragement, support and inspiration. She contributed substantially to complete this task in a resplendent way.*

I am profoundly grateful to ***Mr. V. Manjunath,*** *Associate Professor, Department of Agricultural Statistics, Applied Mathematics and Computer Science, UAS, GKVK, Bengaluru, for his kind co-operation and constructive suggestions during my thesis work.*

I express my deep sense of reverence to ***Dr. G.N. Nagaraja,*** *Professor & Dean (Agri.), College of Agriculture, UAS, GKVK, Bengaluru, for his constant inspiration, precious guidance, comments and encouragement throughout the period of study.*

I use this opportunity to sincerely thank my dearest classmates ***Nirosha, Vedashree, Shriya, Sahana, Chaitra, Rakshith, Shilpa, Saroja, Shilfa, Krishnapriya, Trishna*** *and* ***Shabeer***

for their lovely friendship, love, help and care and for making the two year study very much enjoyable.

I also have been highly fortunate in having many friends whose hands were evident at every moment of tension, anxiety and achievements. I am ever grateful to ***Usha, Rashmi, Teju, Rahul, Vikas, Abhilash, Avi, Siddu, Pallavi, Sushmita, Veena, Evelin, Basavashri, Anu, Neeta, Radhika, Neha, Basava*** *and others. I thank each one of you for being close to me and making my life a memory to be cherished.*

I was privileged to have a great group of senior friends who always offered unconditional help when needed. I thank ***Mr. Ganesh*** *and others. I thank you for being close to me and making my life a memory to be cherished.*

I specially thank ***Vidyasagar, Sunilkumar*** *and* ***Soumya*** *who helped me wholeheartedly for my data collection. I am overwhelmed with gratitude to all my respondents, without whose wholehearted co-operation, this study would not have been fruitful.*

The love, affection and patience of my family have been instrumental for me. Mere words cannot express my profound indebtness to my beloved father ***Sri Chandrakanth Thamke*** *and my brother* ***Mr. Thamke Jagadish*** *for filling my life with laughter and happiness beyond measure.*

I wish to express thanks to our family friends for their support and help during my course of work.

Above all, I thank God for blessing me and bestowing me with success and happiness.

Bengaluru

November, 2018 ***(Ashwini C. Thamke)***

VALUE CHAIN ANALYSIS OF SOYBEAN – A STUDY IN BIDAR DISTRICT OF KARNATAKA

ASHWINI C. THAMKE

ABSTRACT

The present study examined the cost and returns of soybean cultivation; trend in arrivals and prices of soybean in Bidar and Humanabad APMCs; various stakeholders in soybean value chain; marketing channels of soybean; and consumer preference for value-added products of soybean. The primary data was collected from a sample of 40 soybean farmers, 10 traders, 10 wholesalers and 10 retailers of Bidar district; and 80 consumers in Bengaluru city. The results indicated that the average yield of soybean was 10.50 quintals per acre in the study area. The total cost of cultivation of soybean was about Rs. 31,906/- per acre. The gross returns amounted to Rs. 34,387/- per acre and the corresponding net returns was Rs. 2,481/- per acre. In the case of Bidar APMC, the arrivals and prices of soybean registered CAGRs of 44.52 per cent and 5.84 per cent, respectively for the reference period while the corresponding CAGRs were 53.90 per cent and 7.52 per cent, respectively for Humanabad APMC. In soybean value chain, the major actors / players involved include producers, wholesalers (soybean and / or value-added products of soybean), processors, retailers (soybean and / or value-added products of soybean) and consumers. Majority (67.50 %) of the soybean farmers sold their produce through commission agents in APMCs followed by those (32.50 %) who sold to processors while the rest (5.04 %) sold to village merchants. Among the value-added products of soybean, majority (70 %) of the consumers preferred chunks followed by oil (65 %), sauce (44 %), flour (20 %), etc.

November, 2018

Department of Agricultural Marketing,
Co-operation and Business Management
Bengaluru – 560 065

Dr. M.R. GIRISH
Major Advisor

ಕರ್ನಾಟಕದ ಬೀದರ್ ಜಿಲ್ಲೆಯಲ್ಲಿ ಸೋಯಾಬೀನ್ ಮೌಲ್ಯ ಸರಪಳಿಯ ಒಂದು ಅಧ್ಯಯನ

ಅಶ್ವಿನಿ ಸಿ. ಠಮ್ಕೆ

ಸಾರಾಂಶ

ಪ್ರಸ್ತುತ ಅಧ್ಯಯನದಲ್ಲಿ ಸೋಯಾಬೀನ್ ಉತ್ಪಾದನೆಯ ವೆಚ್ಚ ಮತ್ತು ಆದಾಯವನ್ನು ಬೀದರ್ ಜಿಲ್ಲೆಯಲ್ಲಿ ಕೈಗೊಳ್ಳಲಾಗಿದೆ. ಬೀದರ್ ಹಾಗೂ ಹುಮನಬಾದ್ ಕೃಷಿ ಉತ್ಪನ್ನ ಮಾರುಕಟ್ಟೆ ಸಮಿತಿಗಳಲ್ಲಿ ಸೋಯಾಬೀನ್ ಆಗಮನ ಮತ್ತು ಬೆಲೆಯ ಪ್ರವೃತ್ತಿಯನ್ನು ಪರಶೀಲಿಸಲಾಯಿತು. ಸೋಯಾಬೀನ್ ಮೌಲ್ಯ ಸರಪಳಿಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವ ವಿವಿಧ ಪಾಲುದಾರರು, ಸೋಯಾಬೀನ್ ಮಾರಾಟ ಸರಪಳಿ ಹಾಗೂ ಸೋಯಾಬೀನ್ ಮೌಲ್ಯ–ವಧಿತ ಉತ್ಪನ್ನಗಳಿಗೆ ಗ್ರಾಹಕರ ಆದ್ಯತೆಯನ್ನು ವಿಶ್ಲೇಷಿಸಲಾಯಿತು. ಅಧಯಯನಕ್ಕೆ ಬೇಕಾದ ಮಾಹಿತಿಯನ್ನು 40 ಸೋಯಾಬೀನ್ ಉತ್ಪಾದಕರು, 10 ವ್ಯಾಪಾರಿಗಳು, 10 ಸಗಟು ವ್ಯಾಪಾರಿಗಳು, 10 ಚಿಲ್ಲರೆ ವ್ಯಾಪರಿಗಳು ಹಾಗೂ ಬೆಂಗಳೂರಿನ 80 ಸೋಯಾಬೀನ್ ಗ್ರಾಹಕರಿಂದ ಪಡೆಯಲಾಯಿತು. ಸೋಯಾಬೀನ್ ಸಾಗುವಳಿಯ ಒಟ್ಟು ವೆಚ್ಚ ಎಕರೆಗೆ ಸುಮಾರು ರೂ. 31,906/–, ಒಟ್ಟು ಆದಾಯವು ರೂ. 34,387/– ಮತ್ತು ಅನುಗುಣವಾಗಿ ನಿವ್ವಳ ಲಾಭ ರೂ. 2,481 ಎಂದು ಅಧ್ಯಯನದ ವಿಶ್ಲೇಷಣೆಯಿಂದ ತಿಳಿದು ಬಂತು. ಬೀದರ್ ಕೃಷಿ ಉತ್ಪನ್ನ ಮಾರುಕಟ್ಟೆ ಸಮಿತಿ ಪ್ರಕರಣದಲ್ಲಿ ಸೋಯಾಬೀನ್ ಆಗಮನ ಮತ್ತು ಬೆಲೆ (2007–17) ಕ್ರಮವಾಗಿ 44.52ಶೇ. ಮತ್ತು 5.84ಶೇ. ಸಂಯುಕ್ತ ವಾರ್ಷಿಕ ಬೆಳವಣಿಗೆ ದರವನ್ನು ಹೊಂದಿತ್ತು, ಇದಕ್ಕೆ ಅನುಗುಣವಾಗಿ ಹುಮನಬಾದ್ ಕೃಷಿ ಉತ್ಪನ್ನ ಮಾರುಕಟ್ಟೆ ಸಮಿತಿಪ್ರಕರಣದಲ್ಲಿ ಸೋಯಾಬೀನ್ ಆಗಮನವು ಶೇ.53.90 ಹಾಗು ದರವು ಶೇ.7.52 ಸಂಯುಕ್ತ ವಾರ್ಷಿಕ ಬೆಳವನಿಗೆಯನ್ನು ಹೊಂದ್ದಿತ್ತು. ಸೋಯಾಬೀನ್ ಮೌಲ್ಯ ವರ್ದಿತ ಸರಪಳಿಯಲ್ಲಿ ಪ್ರಮುಖವಾಗಿ ಉತ್ಪಾದಕರು, ಸಗಟು ವ್ಯಾಪಾರಿಗಳು (ಸೋಯಾಬೀನ್ ಮತ್ತು/ಅಥವಾ ಮೌಲ್ಯ ವರ್ಧಿತ ಸೋಯಾಬೀನ್), ಸಂಸ್ಕರಣೆದಾರರು, ಚಿಲ್ಲರೆ ವ್ಯಾಪಾರಿಗಳು (ಸೋಯಾಬೀನ್ ಮತ್ತು/ಅಥವಾ ಮೌಲ್ಯ ವರ್ದಿತ ಸೋಯಾಬೀನ್) ಹಾಗೂ ಗ್ರಾಹಕರು ಪ್ರಮುಖ ಪಾತ್ರವನ್ನು ವಹಿಸಿದ್ದರು. ಬಹುತೇಕ (67.50%) ರೈತರು ತಮ್ಮ ಉತ್ಪನ್ನವನ್ನು ಆಯೋಗದ ದಳ್ಳಾಳಿಗಳ ಮೂಲಕ ಮಾರಾಟ ಮಾಡಿದರು, ಶೇ.32.50 ಉತ್ಪಾದಕರು ಸಂಸ್ಕರಣೆದಾರ ಮೂಲಕ ಮಾಡಿದರು ಹಾಗು ಉಳಿದವರು (5.04%) ಹಳ್ಳಿ ವ್ಯಾಪಾರಿಗಳ ಮೂಲಕ ಮಾರಿದರು. ಅಧ್ಯಯನದ ಪ್ರಕಾರ ಬಹುತೇಕ ಸೋಯಾಬೀನ್ ಗ್ರಾಹಕರು (70%) ಸೋಯಾ ಚಂಕ್ಸ್‌ನ್ನು ಆಶಿಸಿದರು ನಂತರ ಶೇ.65 ಗ್ರಾಹಕರು ಸೋಯಾ ಆಯಿಲ್‌ಅನ್ನು ಆಶಿಸಿದರು ಹಾಗು ಸುಮಾರು 44 ಶೇಕಡದಷ್ಟು ಗ್ರಾಹಕರು ಸಾಸ್ ಮತ್ತು 20 ಶೇಕಡದಷ್ಟು ಹಿಟ್ಟನ್ನು ಬಯಸಿದರು.

ನವೆಂಬರ್, 2018
ಕೃಷಿ ಮಾರಾಟ, ಸಹಕಾರ ಮತ್ತು
ವ್ಯವಹಾರ ನಿರ್ವಹಣಾ ವಿಭಾಗ,
ಕೃಷಿ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಜಿಕೆವಿಕೆ,
ಬೆಂಗಳೂರು – 560 065

ಡಾ॥ ಎಂ.ಆರ್. ಗಿರೀಶ್
(ಪ್ರಮುಖ ಸಲಹೆಗಾರರು)

An Analysis of Arrivals and Prices of Soybean in Bidar district of Karnataka

ASHWINI C. THAMKE, MBAL6005 and M.R. GIRISH
Department of Agricultural Marketing, Co-operation and Business Management
University of Agricultural Sciences, GKVK , Bengaluru – 560 065

INTRODUCTION

Soybean (*Glycine max*) is also called as soya bean or soja bean. It is known as the "Golden Bean" of the 20th century. Soybean is economically the most important bean in the world, providing vegetable protein for millions of people. The unique chemical composition of soybean comprising of number of nutraceutical compounds such as isoflavons, tocopherol and lecithin besides 20 per cent oil and 40 per cent protein, has made it one of the most valuable crops in the world. The food derived from soybean generally provides health benefits and is a cheaper source of high quality protein.

India is the fifth largest producer of soybean accounting for about four per cent of the world's production. Soybean is gaining popularity as it is adaptable to varied agro-climatic conditions and due to its scope for manufacturing numerous processed food products. It is also widely used as a source of animal feed.

OBJECTIVE

To analyse the trend in arrivals and prices of soybean in Bidar and Humnabad APMCs.

METHODOLOGY

Study area:

The study was conducted in Bidar district of Karnataka.

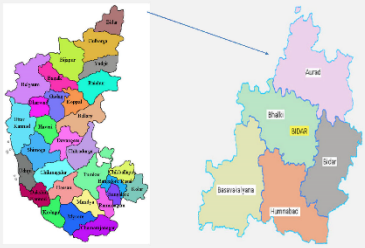

Fig. 1: Map depicting the study area

Source of data:

The secondary data on arrivals and prices of soybean for the period from 2007 to 2017 was collected from Bidar and Humnabad Agricultural Produce Market Committees (APMCs).

Analytical tool:

Seasonal indices were computed to analyze the data pertaining to trends in arrivals and prices of soybean in Bidar and Humnabad APMCs.

RESULTS

Table 1: Arrival and Price Indices of Soybean in Bidar APMC

Sl. No.	Month	Arrivals	Price
1.	January	0	0
2.	February	0	0
3.	March	0	0
4.	April	0	0
5.	May	0	0
6.	June	0	0
7.	July	0	0
8.	August	0	0
9.	September	0	0
10.	October	549.96	351.26
11.	November	538.70	401.68
12.	December	111.32	447.04

Table 2: Arrival and Price Indices of Soybean in Humnabad APMC

Sl. No.	Month	Arrivals	Price
1.	January	18.92	162.84
2.	February	5.98	64.28
3.	March	1.45	138.91
4.	April	0	0
5.	May	0	0
6.	June	0	0
7.	July	0	0
8.	August	0	0
9.	September	17.98	155.71
10.	October	810.44	234.13
11.	November	290.53	233.31
12.	December	54.68	210.79

GRAPHS

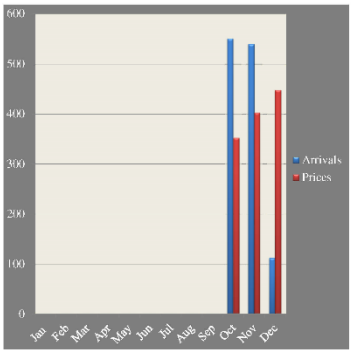

Fig. 2: Arrival and Price Indices of Soybean in Bidar APMC

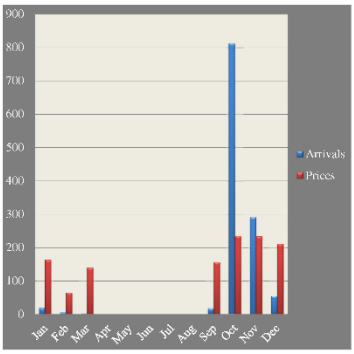

Fig. 3: Arrival and Price Indices of Soybean in Humnabad APMC

DISCUSSION

In the case of Bidar APMC, the arrivals of soybean were confined to the months of October, November and December (Table 1). This is because in Bidar district, soybean is grown as a kharif crop. It is generally sown during the month of July and harvested during the month of September. Accordingly, the arrivals were peak in October followed by November and December. The price of any commodity is inversely related with its supply in the market and the same was observed in the case of soybean in Bidar APMC with price index being lowest for October month and highest for December month.

However, in the case of Humnabad APMC, the arrivals of soybean were spread over seven months, from September to March (Table 2). As mentioned earlier, soybean is grown as a kharif crop in Bidar district. In Humnabad taluk, some farmers sow relatively early while some farmers sow relatively late when compared to farmers of Bidar taluk. As a consequence, the soybean crop season ranges from September to March. The price index was highest for the month of October while it was lowest for February month.

SUMMARY

The soybean prices were lowest during the month of peak arrivals in the case of Bidar APMC. Accordingly, the prices recovered as the arrivals decreased. Hence, the farmers may be sensitised about the need for deferring the sale of the produce so as to realise better prices. In this regard, accurate and timely market information and intelligence needs to be made available / disseminated by the authority concerned.

ADVISORY COMMITTEE

Chairperson: **Dr. M.R. Girish**
Members: **Dr. M.S. Jayaram**
Dr. Mamatha Girish
Mr. V. Manjunath

CONTENTS

LIST OF TABLES

LIST OF FIGURES

I INTRODUCTION

Soybean (*Glycine max*) also called soja bean or soya bean, is an annual legume of the pea family (Fabaceae) and is an edible seed. The soybean is economically the most important bean in the world, providing vegetable protein for millions of people and ingredients for hundreds of chemical products. The origins of the soybean plant are obscure, but many botanists believe it was first domesticated in central China as early as 7000 BC. Soybean has been used in China, Japan and Korea for thousands of years as a food and a component of medicines. Soybean was introduced into the United States in 1804 and became particularly important in the South and Mid-west in the mid-20th century. Brazil and Argentina are also major producers.

Soybean is known as the "Golden Bean" of the twentieth century. Though, soybean is a legume crop, yet it is widely used as an oilseed. Due to very poor cookability and digestibility on account of inherent presence of trypsin inhibitor, it cannot be utilised as a pulse. It is now the second largest oilseed in India after groundnut. It grows in varied agro-climatic conditions. It has emerged as an important commercial crop in many countries and international trade of soybean is spread globally. Several countries such as Japan, China, Indonesia, Philippines and European countries are importing soybean to supplement their domestic requirement for human consumption and cattle feed.

Soybean is gaining popularity on account of its unique characteristics and adaptability to varied agro-climatic conditions. It has unmatched composition of 40 per cent protein and 20 per cent oil and nutritional superiority on account of containing essential amino acids, unsaturated fatty acids, carbohydrates, vitamins and minerals. Soybean protein is rich in valuable amino acid lycine (5 %) in which most cereals are deficient. In addition, it contains good amount of minerals, salts and vitamins (thiamine and riboflavin) and its sprouting grains contain considerable amount of Vitamin C. (http://220.226.199.146/cmt/upload/research/PN_SOYBEAN.pdf)

1.1 Soybean Products and their Uses

Soyoil is used mostly for production of vegetable oil and margarine. In its pure form as a vegetable oil, it is often used in salad dressings and mayonnaise; as a vegetable fat, it is used for baking and frying. Soya lecithin acts as an emulsifier in some chocolates, breakfast cereals, ice cream, sweets and margarine. Soyoil is also used in a wide variety of non-food products, e.g. soap, biological detergents, plastics and CFC-free cooling agents; the derivative glycerine is used in the manufacture of emulsifiers for skin cream and softeners for gelatin capsules.

Soy flours are used to increase the shelf-life of many products and improve the colour of pastry crusts. The flour is free of gluten and hence cannot replace all wheat or rye flour in bread making but can be used at about 15 per cent to give a dense bread with a nutty flavour and moist quality. Texturised Soy Protein / Texturised Vegetable Protein (TSP / TVP) is made from soy flour that is compressed until the fibre changes in structure. It is available to home cooks as a dried, granular product and in chunk-sized pieces for rehydrating and use as a meat-replacer.

Isolated soy protein is used in biscuits, sweets, diet drinks, pasta and frozen foods. It also improves the consistency of meat products. It is added to many foods including pizzas, noodles, bread and foods for special dietary needs, for instance soy drinks, which serve as a substitute for cow's milk. Fermenting soy protein can make various cheese and other milk and meat substitute products, such as miso, tofu and tempeh.

It is widely used in the industrial production of different antibiotics. It plays significant role in preventing and treating chronic diseases such as heart ailments, osteoporosis, cancer, kidney ailments and menopausal syndromes. It can be used as fodder; forage can be made into hay, silage, etc. Its forage and cake are excellent nutritive foods for livestock and poultry. Soybean being the richest, cheapest and easiest source of best quality proteins and fats and having a vast multiplicity of uses as food and industrial products is sometimes called a 'wonder crop'.

1.2 Global Scenario

The major soybean producing nations are the United States, Brazil and Argentina. These three countries accounted for about 80 per cent of the world's soybean supply in 2016-17. The global production of soybean has grown at a compound annual growth rate of 2.78 per cent from 215.69 million metric tonnes in 2004-05 to 346.91 million metric tonnes in 2017-18.

Although a native of China, soybean for all practical purposes is an American crop today. The US is the major producer of soybean and ranks first in production. Brazil, Argentina and China rank second, third and fourth position respectively in terms of production. India occupies fifth place.

Soy is now a global staple food and about 220 million tonnes of beans are produced annually. The total area under soybean cultivation in the world in the year 2014-15 was 91.29 million hectares, contributed mainly by United States (31 %), Brazil (26 %) and Argentina (20 %). The rest 23 per cent is accounted by China (10 %), India (10 %) and Paraguay (3 %).

The US (36 %), Brazil (39 %) and Argentina (15 %) are the major exporters of soybean; and Argentina and Brazil are the major exporters of soy oil. China and EU are the major importers of soybean; and China and India are the major importers of soy oil.

1.3 Importance of Soybean in Indian Economy

Soybean contributes significantly to the Indian edible oil pool, contributing 43 per cent to the total oilseeds and 25 per cent to the total oil production in the country. Currently, India ranks fourth with regard to production of soybean in the world. The crop helps earn valuable foreign exchange (Rs. 6,200 crores in 2012-13) by way of soya meal exports.

Soybean has largely been responsible in uplifting farmer’s economic status in many pockets of the country. It usually fetches higher income to the farmers owing to the huge export market for soybean de-oiled cake.

In the recent past, soybean cultivation has increased manifold as compared to any other oilseed crop in India and stands next only to groundnut, though commercial production of soybean began only in 1971-72. Soybean is grown in an area of 116 lakh hectares with an annual production 114 lakh MT (2016-17). Soybean production is mainly confined to Madhya Pradesh (also known as soybean bowl of India), Maharashtra, Rajasthan, Andhra Pradesh, Karnataka, Uttar Pradesh and Chhattisgarh.

The soybean crop is grown mainly in the states of Madhya Pradesh, Maharashtra and Rajasthan. About 53 per cent of the country's soybean acreage is in Madhya Pradesh. The area under the crop steadily increased from 22.5 lakh hectares in 1989-90 to 101.56 lakh hectares in 2016-17. The soybean production in the country is also steadily increasing.

Though, the annual domestic production of soybean is 94.73 lakh tonnes, it has not been able to make a dent in India's import dependence for edible oils. With the steady increase in India's population, the days of self-sufficiency in oils and oilseeds still remains distant. Hence, soybean export from India is not allowed. At the same time, bean imports are also restricted so as to encourage domestic production. However, there are no imports of soybean in India as it is more feasible to import oil.

India is the world's second largest importer of vegetable oil after China. India is dominated by palm group of oils followed by soybean oil. With imports, the total oil availability in the country is around 13 million tonnes (2013-14). The oil import is unrestricted and the Government uses tariff mechanism to regulate import volumes. India is not an exporter of soybean oil and seed. However, it is one of the major exporters of oil meal, particularly to Asian countries and soy meal forms a major part of it. The soy meal obtained in India is known for its purity, quality and high nutritive content. India crushes all the marketable surplus of soybean available with it. Indian soybean when crushed gives about 17-18 per cent of oil and about 80 per cent of meal and some more oil can be extracted from the meal after which it is called de-oiled cake (DOC). The country consumes about 30 per cent of soy meal produced and rest of it is exported. India, does

not import soy meal to meet the requirements of the domestic feed industry, as the price equation inclusive of transport does not work in favour of imports.

Today, there is a strong need to review the import policy and allow the import of oilseeds (preferably soybean) in partial replacement of crude of refined oils. At present, there is a 30 per cent import duty on soybean and its import is permitted only in split form only, which is not acceptable. China changed its policy long back and now imports more soybean than soy oil and soy meal. At present, India could produce only about 50 per cent of its domestic edible oil consumption though there is adequate capacity for oilseed crushing, solvent extraction and refining. To meet the domestic demand and also prevent a spurt in domestic prices, the Union Government has liberalised the imports of vegetable oils considerably in the recent years. This has also added to the woes of the industry as the availability of cheap imported vegetable oils has considerably reduced the margins of the solvent extraction industry. The industry and trade in India went through turmoil due to lower domestic prices of vegetable oils, lower domestic output of oilseeds, high price of domestic oilseeds and increasing imports of cheaper vegetable oils in recent years.

1.4 Soybean Production in Karnataka

Soybean in Karnataka is mainly produced during kharif season. The major soybean growing areas in Karnataka are Bidar, Kalaburagi, Belagavi, Dharwad, Bagalkot and Haveri. The total acreage under soybean in the state was 2.5 lakh hectares with a production base of 2.7 lakh tonnes and yield of 1,311 kgs / ha. in 2014-15.

1.5 Soybean Production in Bidar District

Bidar stands first in area and productivity of soybean in Karnataka. The total acreage under soybean in Bidar was 1.2 lakh hectares with a production base of 1.7 lakh tonnes and yield of 1,679 kgs / ha. in 2014-15.

1.6 Value Chain

A ‘Value Chain’ is a sequence of target-oriented combinations of production factors that create a marketable product or service from its conception to the final consumption. This includes activities such as design, production, marketing, distribution and support services up to the final consumer. In simple terms, the term ‘Value Chain’ refers to the fact that value is added to preliminary products through the combination with other resources (for example, tools, manpower, knowledge and skills, other raw materials or preliminary products). As the product passes through several stages of the value chain, the value of the product increases.

The Value Chain, also known as Value Chain Analysis (VCA), is a concept from business management that was first described and popularised by Michael Porter in his 1985 best-seller, ‘Competitive Advantage: Creating and Sustaining Superior Performance’. Adding value to a product passing through a chain of activities is called Porter’s Value Chain.

Influential work by Michael Porter suggested that the activities of a Value Chain could be grouped under two headings:

1. Primary Activities – those that are directly concerned with creating and delivering a product (e.g. component assembling); and
2. Support Activities – they are not directly involved in production, may increase effectiveness or efficiency (e.g. human resource management). It is rare for a business to undertake all primary and support activities.

1.7 Need for the Study

The value chain analysis for soybean will help in identifying the actors involved in the value chain. Value chain mapping basically uses a participant worksheet which includes production, assembling, processing, wholesaling, retailing and consumption. These elements help to organise key information about the role of each participant in the value chain. It also identifies the potential opportunities for upgrading the value chain and

to open up those opportunities. It also suggests strategies to improve the marketing of soybean.

1.8 Objectives of the Study

1. To estimate the cost and returns of soybean cultivation.
2. To analyse the trend in arrivals and prices of soybean in Bidar and Humanabad APMCs.
3. To identify the various stakeholders in soybean sub-sector and map the value chain.
4. To analyse the marketing channels of soybean.
5. To analyse the consumer preference for value added products of soybean.

1.9 Hypotheses of the Study

1. The cultivation of soybean is profitable.
2. There is an increasing trend in both arrivals and prices of soybean in Bidar and Humanabad APMCs.
3. About 25 per cent of the soybean produced is disposed off at the village level.
4. The most preferred value added product of soybean among consumers is soy chunks.

1.10 Presentation of the Study

The thesis is organised into five chapters. The first chapter provides a brief introduction along with the specific objectives. In second chapter, some pertinent reviews are presented in consonance with the study objectives. The third chapter describes main features of the study area, sampling framework, database and analytical tools used in the analysis of data. The empirical results and discussion are presented in fourth chapter. Finally, the fifth chapter summarizes the major findings of the study and includes implications of the study.

II REVIEW OF LITERATURE

A review of the research work done earlier pertaining to the present study has been presented below. Since, the value chain is of recent interests, the studies conducted on soybean value chain are very few. In this chapter, efforts have been made to present the reviews of the studies on value chain. The review of literature is presented under the following sub-headings.

2.1 Cost and returns from cultivation of agricultural commodities

2.2 Arrivals and prices of agricultural commodities in APMCs

2.3 Value chain of agricultural commodities

2.4 Marketing channels of agricultural commodities

2.5 Consumer preference for value added products of agricultural commodities

2.1 Cost and returns from cultivation of agricultural commodities

Tiwari and Sushant (2012) estimated the costs, returns and resource-use efficiency of soybean cultivation in Indore district of Madhya Pradesh. The study was conducted during the year 2009-10. The results indicated that per hectare cost of cultivation of soybean was estimated at Rs. 30,740.85/-, Rs. 28,466.26/- and Rs. 29,587.43/- on small, large and pooled farms, respectively and thus exhibiting inverse relationship with the size of the farm. The cost of producing a quintal of soybean showed direct relationship with the size of the holding as it was Rs. 1,727/- on small farms, Rs. 1,848.45/- on large farms and Rs. 1,793.20/- on pooled farms. The net income decreased from Rs. 13,342.47/- on small farms to Rs. 8,986.56/- on large farms while it was Rs. 10,999.42/- for pooled farms.

Akram (2013) analysed the economics of tur cultivation in Karnataka. The results indicated that the cost of cultivation of tur was significantly high as compared to other pulse crops. The cost of production was highest (Rs. 9,343.69/- per acre) in large size group as compared to medium and small size groups (Rs. 7,876.90/- and Rs. 5,949.84/-,

respectively). The yield was highest (428 kgs / acre) on large farms followed by medium and small farms (425 kgs and 325 kgs, respectively).

Agarwal and Singh (2014) analysed the economics of soybean cultivation in Narsinghpur district of Madhya Pradesh. The study was conducted during the year 2012-13. The results indicated that the average per hectare gross return from soybean was found to be Rs. 43,179.59/- and the cost of production per quintal of soybean was Rs. 1,354.92/-. The benefit cost ratio was 1.76 in the case of small farmers while it was 1.74 in the case of medium and large farmers. Though, potassic fertilizers play a vital role in formation of nodules and enzymatic activities, none of the farmers applied them. Therefore, the authors opined that to realise higher yields, the farmers need to apply potassic fertilizers.

Mane *et al*. (2014) estimated the costs, returns and profitability of summer groundnut in Hingoli district of Maharashtra. The study was conducted during the year 2011-12. The results revealed that irrigation and hired human labour were the major costs for both varieties, viz., TAG-24 and SB-11. The per hectare cost of cultivation of TAG-24 was Rs. 84,818.47/- while that of SB-11 was Rs. 83,123.46/- and the gross returns were Rs. 13,7411.83/- and Rs. 99,312.74/-, respectively. It was observed that the farm business income was Rs. 82,098.70/- and Rs. 43,600.58/- for TAG-24 and SB-11, respectively; and the per quintal cost of groundnut production was Rs. 2,654.57/- and Rs. 3,668.35/-, respectively. The TAG-24 variety was relatively more profitable (output-input ratio of 1.62) than SB-11 variety (output-input ratio of 1.19).

Trilapura and Mundinamani (2014) analysed the economics of production of major crops in Dharwad district of Karnataka. The study revealed that farmers in the study area used seed rate as per the recommendation in the case of maize, cotton and chilli crops; and more seed rate than recommended in the case of rice, chickpea and soybean cultivation. The farmers used organic fertilizers less than the recommended dose. The cost of cultivation of chickpea, rice, soybean, cotton, chilli and maize crops under rainfed situation was Rs. 25,181.16/-, Rs. 22,629.66/-, Rs. 19,324.56/-, Rs. 28,178.37/-, Rs. 36,986.72/- and Rs. 21509.00/-, respectively. The cost of cultivation of

cotton, chilli and maize under irrigated conditions were found to be Rs. 34,835.73/-, Rs. 36,986.72/- and Rs. 28,511.04/-, respectively. Based on B:C ratio, it is more profitable to grow cotton under both irrigated (2.46) and rainfed (2.25) situations compared to chickpea (1.58), rice (1.26), soybean (1.72), irrigated chilli (2.43), rainfed chilli (2.07), irrigated maize (1.88) and rainfed maize (1.80).

Sharma (2016) estimated the costs, returns and profitability of soybean cultivation in India. The study was based on secondary data collected from publications of Commission on Agricultural Costs and Prices (CACP) and Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, Govt. of India. The state-wise area, production and yield data of soybean for the period 1980-81 to 2012-13; and input-wise costs and returns data for major states from 1981-82 to 2011-12 have been analysed. The use of soybean seed in Rajasthan and Madhya Pradesh was found to be higher than the recommended level, i.e., 75-80 kgs / ha. In the states of Madhya Pradesh and Maharashtra, farmers used more of FYM when compared to those in Rajasthan while in the case of fertilizers, farmers in Rajasthan used lesser quantities when compared to those in Madhya Pradesh and Maharashtra. The results indicated that the growth in real cost of cultivation of soybean outpaced the growth in real returns from soybean in all major states. The inverse relationship in cost of production and productivity of soybean was observed in all major growing states. As the productivity of crop is the major factor in reducing the relative cost of production, the Government may focus on the non-price incentives to increase the productivity and also to reduce the cost of cultivation, apart from price incentives.

Angadi and Patil (2018) analysed the economics of green gram in Gadag district of Karnataka. The study was conducted during the year 2014-15. The results revealed that among the three categories of farmers, the total cost incurred by the small farmers was the highest (Rs. 22,889.08/- per ha) as compared to medium and large farmers (Rs. 22,653.45/- per ha and Rs. 22,268.21/- per ha). The net returns per hectare obtained by large farmers were the highest (Rs. 18,479.79/- per ha) as compared to small and medium farmers (Rs. 16,430.92/- per ha and Rs. 17,138/- per ha respectively).

2.2 Arrivals and prices of agricultural commodities in APMCs

Benke *et al.* (2010) analysed the arrivals and prices of soybean in Akola district of Maharashtra. The arrivals of soybean to Akola market registered a CAGR of 27.40 for the period from 1987 to 2006. The seasonal indices of soybean arrivals revealed that it was highest (387) for the month of November while it was lowest (19.51) for July. In the case of prices, the index was the highest (106.77) for the month of June while it was lowest (93.25) for February.

Ahmed *et al.* (2015) analysed the pattern of production and market arrivals of paddy in Bangarpet taluk of Kolar district for the period 2000-01 to 2012-13. They reported that the area and production of paddy in the taluk increased at a rate of 0.94 per cent and 0.80 per cent, respectively while productivity registered a negative growth rate (-0.14 %). The market arrivals of paddy to Bangarpet APMC increased at a growth rate of 41.6 per cent during the reference period.

Vani and Srikala (2015) analysed the arrival and price behaviour of groundnut in selected markets of Andhra Pradesh. The results revealed that there was an increasing trend in the prices of groundnut. The annual increase in the prices of groundnut was found to be highest (Rs. 28.76/- per qtl) in Karimnagar market while it was lowest (Rs. 10.28/- per qtl) in Kurnool market. The arrivals of groundnut were found to be highest in November and December as revealed by the indices of Adoni market while the same were highest in August in the markets of Badepalli and Gadwal. The lowest arrivals were conspicuous in July and August for Adoni market; and in January, May and April for Badepalli market. In Adoni market, for groundnut, the highest seasonal index was found for November month while the lowest index was for January month. In Badepalli market, the highest index was for January while the lowest index was for February. In Kurnool market, the seasonal index was highest for April and lowest for September.

Benke *et at.* (2016) analysed the arrival and price behaviour of green gram in Akola district of Maharashtra. The results indicated that the compound growth rate of production and arrival were found to be positively associated in period I (1987-96) of study and negatively associated in period II (1997-2006) of study for Akola APMC.

Despite pronounced seasonality in arrivals, there were negligible variations in seasonal prices of green gram. The cyclical fluctuations were found to be more pronounced than seasonal fluctuations in prices.

Bodade *et al.* (2016) analysed the arrival and price behaviour of soybean in major markets of Madhya Pradesh. The study covered four markets, viz., Betul, Dewas, Dhar and Indore for the period 2004-2015. The results of study showed that the prices of soybean were higher in the months of June, July and August in all the selected markets. The cyclical variation was observed in the prices of soybean for all the selected markets.

Meera and Hemant (2016) analysed the trend in arrivals and prices of wheat in selected markets of Sriganganagar district of Rajasthan for a period of 10 years, i.e., from 2005 to 2014. There was an increasing trend in prices of wheat for all the selected markets. Since, wheat is a rabi crop, the arrivals were high during March to May. The higher seasonal indices of prices were observed during December to February during which the arrivals were found to be low.

Thakre *et al.* (2017) analysed the trend in arrival and prices of agricultural commodities in Kolhapur APMC of Maharashtra. The study covered the arrivals and prices of wheat, paddy, onion, potato, groundnut and jaggery for a period of 11 years, i.e., from 2001-02 to 2011-12. The arrivals of paddy increased significantly while that of wheat decreased significantly for the reference period. The prices of wheat, paddy, onion, potato, groundnut and jaggery increased significantly during the period under study. An inverse relationship between arrivals and prices was noticed for wheat, jaggery and groundnut; while the relationship was positive for paddy, onion and potato.

2.3 Value chain of agricultural commodities

Hoffler and Maingi (2005) studied agricultural value chains linking urban consumption with rural production. They found out that changing demand impacts on rural areas along value chains and spills over to marketing and production systems. These rural-urban linkages not only bear challenges but also mutual benefits for producers and consumers and can be promising entry points for agricultural development interventions.

Clottey *et al.* (2009) studied the tomato industry in Northern Ghana. They found that the market-oriented agricultural development is a way to empower smallholder farmers in developing countries who are increasingly getting involved in commodity value chains. The position of smallholder farmers in commodity value chains can be improved by enhancing their distinctive competencies. They assessed tomato industry competitiveness and possible pathways to empower smallholder farmers to grow from supply chain actors into value chain integrators and possibly co-owners of the tomato value chain.

Daniel *et al*. (2009) conducted a value chain analysis to understand processing and marketing-related aspects of Indian gooseberry (*Emblica officinalis*), tamarind (*Tamarindus indica*) and kokum (*Garcinia indica*). The study indicated that fresh and processed fruits of these species are dependent on intermediaries for marketing. The share of farmers and primary processors in value addition was very small. They opined that alternative models of production and processing have to be evolved to realise the environmental and economic benefits of these underutilized fruit species.

Mugisha *et al.* (2014) analysed the value chain of groundnut in Uganda. They recommended that the capacity of value chain actors may be built so that the constraints are turned into opportunities. They may also be provided with simple but efficient equipment such as the mobile sheller at affordable cost. Research activities in developing disease and pest resistant varieties, high yielding varieties and high quality products may be supported. The value chain actors may be sensitized on quality aspects including aflatoxins and the associated causes, effects and prevention/control.

Kedir (2017) analysed the value chain of sesame in Ethiopia. The study indicated that the sesame value chain has several constraints which hinder effective value chain of the commodity. Some of the constraints were lack of improved cultivars, poor seed supply system, weak farmer's organization to engage in the value chain and poor market information system.

2.4 Marketing channels of agricultural commodities

Gandhi and Namboodiri (2002) studied the marketing efficiency of fruits and vegetables in India. The study found that the extent of contact between farmers and commission agents is low and needs considerable improvement. It also reported that the adoption of open auctions in the markets is very low and there is plenty of scope for enhancing the marketing efficiency.

Chavhal *et al.* (2014) analysed marketing cost, marketing margin and price spread of soybean in Parbhani district of Maharashtra. In the study area, three types of marketing channels were observed, viz., producer - village merchant - wholesaler- oil processor (channel I); producer - wholesaler - oil processor (channel II); and producer - oil processor channel III). The maximum quantity of soybean was sold through channel II. The marketing cost was highest in channel I and lowest in channel III. The producer's share in consumer rupee was highest (98.83 %) in channel III while it was lowest (83.14 %) in channel I.

Leelansh and Puneet (2014) analysed the marketing of tomato in Agra district of Uttar Pradesh. The sale pattern of tomato revealed that the maximum quantity (about 85 %) was sold by the growers in the wholesale market. The rest of the sale was in retail market (11.45 %), at the farm (2.83%) and in the village (0.92%). The producer's share was the highest in the direct sale, which decreased with the inclusion of intermediaries. Channel I (producer-consumer) was better than other channels. The study suggested that farmers need to organise self-help groups and co-operative societies to get rid of superfluous marketing charges. The marketing efficiency of channel I was highest (7.78) followed by channel II (2.31) channel III (1.71).

Mishra *et al.* (2014) analysed the marketing of major vegetables in Varanasi district of Uttar Pradesh. The results indicated that as the number of middlemen in the marketing channel increased, the marketing efficiency decreased due to increase in marketing cost and margin. The total marketing cost and marketing margin involved in unorganized channel was much higher than the organized channel for the vegetable crops. The study revealed that the different factors influencing farmers to sell their

vegetables to a particular format in the supply chain were spot payment, correct weighment, proximity and remunerative price.

Kumar *et al.* (2015) analysed the different marketing channels, marketing efficiency and problems / constraints in vegetable marketing in Varanasi district of Uttar Pradesh. The study of different marketing channels revealed that as the number of middlemen in marketing channel increases, the marketing efficiency of the produce decreases due to increase in marketing cost and margin. They opined that there would be an ample scope for farmers to sell their produce effectively if the number of middlemen in marketing channel decreased and the marketing efficiency would be high in all cases when marketing channel is short and vice-versa.

Thomas *et al.* (2015) analysed the marketing of green chilli in Kaushambi district of Uttar Pradesh. The study revealed that non-availability of an organised market was the major marketing constraint. Therefore, establishing a regulated market at block level in the study area is the need of the hour. The disposal of green chilli through growers to consumers being the dominant channel in the area needs to be strengthened with new technology of processing. The strengthening of processing units in the area would encourage the farmers to produce more green chilli which may further help in development of an organized market.

Jorwar *et al.* (2018) analysed the economics of production and marketing of chilli in Amravati district of Maharashtra. Three marketing channels were found, namely, Channel I (Producer - Consumer); Channel II (Producer - Retailer - Consumer); and Channel III (Producer - Wholesaler - Retailer - Consumer). The total marketing cost of chilli in channel I was lowest (Rs. 107.40/- per quintal) followed by channel II (Rs. 264.06/- per quintal) and in channel III (Rs. 290.66/- per quintal). The producer's share in consumer rupee was highest (92.31 %) in channel I. The marketing efficiency for channels I, II and III were estimated to be 24.02, 9.17 and 8.24, respectively.

2.5 Consumer preference for value added products of agricultural commodities

Martin and Baby (2013) studied the consumer preferences in purchase of ready-to-eat snacks - branded potato chips. They found that majority of the consumers preferred Kurkure, Lays and Cheetos. Most of the consumers expressed concern over the price and stated as high. It was observed that about 56 per cent of the respondents consumed chips just for the sake of time pass followed by taste (37.5 %). For consumers, the important factors were lower price, variety and availability while for retailers, it were availability and advertisement.

Shukla *et al.* (2013) studied the consumer behaviour and preference for mango pulp in south Gujarat. They reported that the production and marketing of mango pulp has great potential and opportunity for trade in local and regional markets. The mango pulp has demand throughout the year and the product is considered a delicacy and a specialty product offered on special occasions. The preference was found to be very dispersed as it depends upon the availability of the brands at the retail store. The preference also varied in different regions due to local availability and presence of local brands in their respective regions. The major factors affecting the purchase decision by the consumers were taste, quality, improved packaging and hygiene standards.

Ushadevi (2013) studied the consumer preference and attitude towards branded coconut oil in Kerala. The study reported that there was high demand for branded coconut oil among consumers due to its convenience in handling and perceived shelf-life. The study indicated an increasing market potential for branded coconut oil market as the consumers were both quality and price conscious. Hence, framing of new marketing strategies would satisfy the consumers and motivate them to shift to branded items.

Bhanu *et al.* (2017) studied the consumer preference for dairy products in Trivandrum. They found that among all the dairy products, curd was preferred by all the sample households. Ice cream was the second most preferred dairy product followed by khoa, ghee, butter, paneer and cheese. In the case of whole milk, the nutritive value of milk was the most important reason for preference by household consumers. The other reasons for preferring whole milk were taste, satisfaction, quality, availability, low price

and bulkiness. Satisfaction was the second important reason for preferring curd. The nutritive value was the third important reason for preferring curd followed by quality, availability, low price and bulkiness. The study revealed that the major reason for preferring dairy products by household consumers was taste followed by satisfaction, quality, availability, nutritive value, low price and bulkiness.

Kulkarni and Kholatkar (2017) studied the buying behaviour of consumers of edible oil in Pune city. The study revealed that the sample consumers showed less interest in the package of edible oils and in understanding the factors, such as, ingredients, net weight, nutritional benefits, expiry date, etc. Majority of them are consuming edible oil almost every day given the importance of oil in preparation of food in India. Therefore, it constituted an important component of food expenditure for majority of the households. Majority of the consumers preferred retail shops, located close to their residence for buying edible oils while some of them purchased from malls / supermarkets.

Lekshmi *et al.* (2017) studied the consumer buying behaviour towards Eastern Pickles in South India. They found that majority of the consumers were satisfied with the brand Eastern Pickles. The study reported that media advertisements have very low role in attracting the consumers and most of the consumers were aware of the product through retail stores. The study revealed that Eastern Pickles had a fair number of loyal customers.

III METHODOLOGY

The nature and source of data and the analytical tools used in the study are presented in this chapter. The details of methodology are presented in the following sub-headings.

3.1 Selection and description of study area

3.2 Sampling procedure

3.3 Nature and sources of data

3.4 Analytical tools and techniques

3.1 Selection and description of study area

3.1.1 Selection of study area

Bidar district (Fig. 1) was purposively selected for the study. As per 2016-17 statistics, the district stands first in acreage and productivity of soybean in Karnataka state. In the present study, the cost and returns of soybean cultivation; trend in arrivals and prices of soybean; soybean value chain mapping; and marketing channels of soybean, pertained to Bidar district. To analyse the trend in arrivals and prices of soybean, both the APMCs of Bidar district i.e., Bidar and Humanabad APMCs were considered. The analysis pertaining to consumers' preference for value added products of soybean was carried out in Bengaluru city as it is cosmopolitan in nature and moreover, it is one of the fastest growing cities in India.

3.1.2 Description of study area

The district extends from latitude of 17.35' North to 18.25' North and from the longitudes of 76.42' East to 77.39' East which is located on the northern maidans of Karnataka which provides a mountainous treeless expansive plateau landscape. Physiographically, the district can be divided into two regions, the northern low lands and southern high lands. The southern high lands are popularly known as Bidar plateau, which is made up of laterite soil. The ground altitudes vary from 420 to 684 m above MSL. Bidar plateau has an elevation range from 640 to 684 m above MSL. The

ground surface is flat, gently sloping forming broad valleys and flat topped hills. The flat topped hills with step-like sides exhibit terraced landscape. The southern half of the district is a high plateau, about 715 m above MSL and they are well drained.

According to the 2011 Census, Bidar district has a population of 17,00,018 consisting of 8,70,665 males and 8,62,635 females (Table 3.1). The district has a population density of 312 inhabitants per square kilometer. The district comprises of 699 villages under 168 gram panchayaths, seven municipal limits and 37 hoblies. Bidar has a sex ratio of 952 females for every 1000 males.

The soil type is red laterite and medium to deep black soil. Bidar district lies under agricultural zone-1 (Northern Transitional Zone). The district receives kharif rains from July to September and rabi rains from October to December. The major crops in kharif season are paddy and jowar among cereals; red gram, bengal gram, green gram, black gram and horse gram among pulses; soybean, groundnut, sunflower and safflower; and sugarcane and cotton among commercial crops.

Bengaluru is located in the Deccan Plateau in South-eastern Karnataka. It has an estimated population of 6.1 million, making it India's third-largest city and fifth-largest metropolitan centre. Bengaluru is situated in the South-east part of Karnataka at an average elevation of 920 meters (3,018 feet). It is positioned at 12.97° North 77.56° East and covers an area of 2,190 sq. kms. The highest temperature recorded is 39°C (102°F) and the lowest is 11°C (52°F). The wettest months are August, September and October; with a heaviest rainfall of 180 mm recorded in 24-hours period.

Bengaluru district has borders of Kolar district in the North-east, Tumkur district in the North-west, Mandya district in the South-west, Chamarajanagar district in the South and the neighbouring state of Tamil Nadu in the South-east.

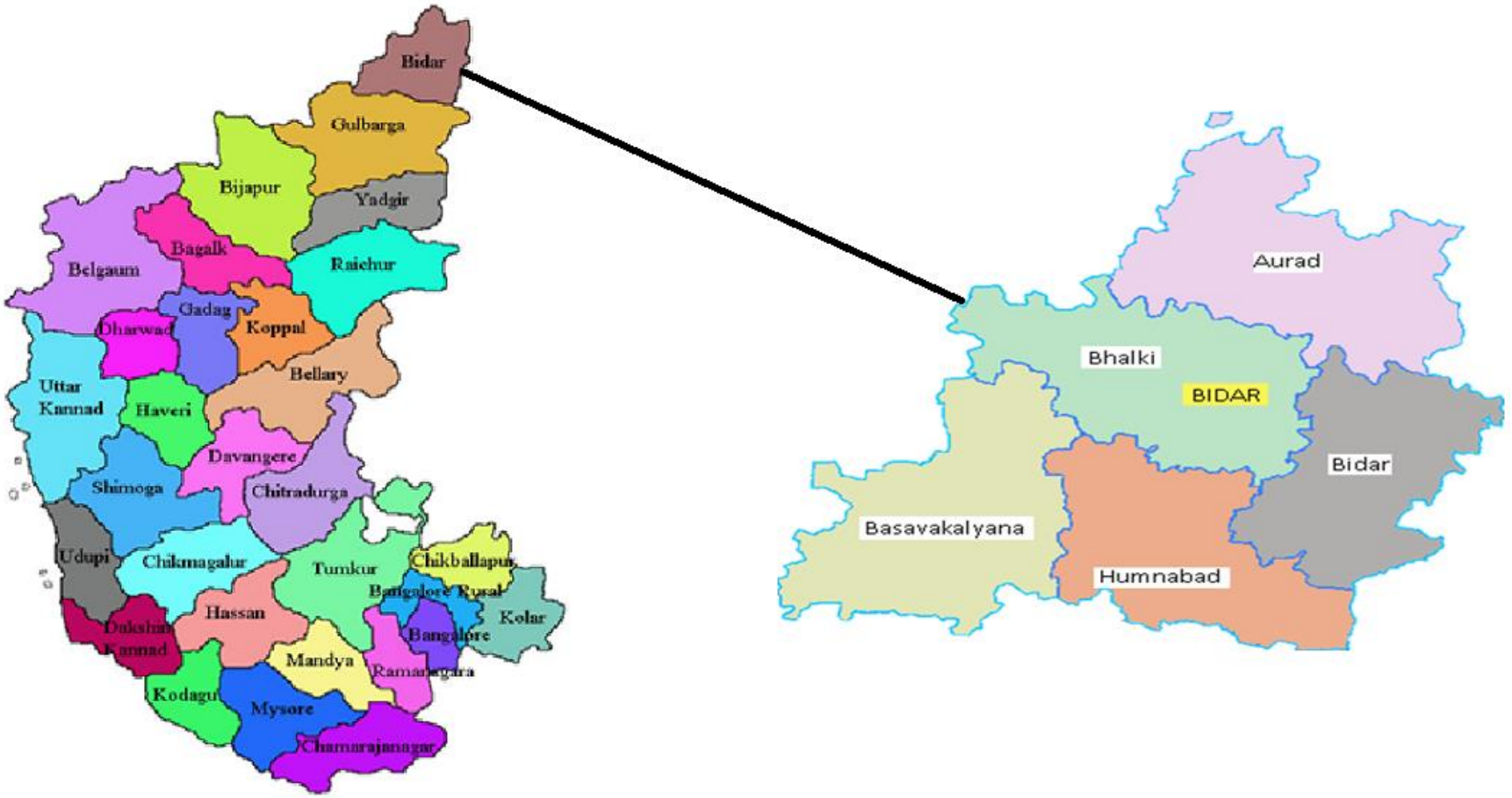

Fig. 1: Map depicting study area - Bidar district

Table 3.1: General information of Bidar district, Karnataka

Sl. No.	Particulars	Unit	Number
1.	Taluk	No.	8
2.	Villages	No.	699
3.	Total Population	No.	17,03,300
4.	Population – Female	No.	8,32,635
5.	Population – Male	No.	8,70,665
6.	Sex Ratio	No. of females per 1000 males	956
7.	Population	Density / sq. km	310
8.	Total Geographical Area	sq. km	5,417.65
9.	Forest Area	sq. km	277.07
10.	Total Sown Area	Ha	4,01,125
11.	Literacy Rate	Per cent	70.51
	a) Female Literacy Rate	Per cent	61.55
	b) Male Literacy Rate	Per cent	79.09
12.	Temperature		
	a) Minimum	^{0}C	20
	b) Maximum	^{0}C	42
13.	Average Rainfall	mm	3,047

3.2 Sampling procedure

Multi-stage sampling method was adopted for the study to collect the necessary information from all the players who were involved in the value chain of soybean. Primarily, the information regarding the production, marketing and other aspects of value chain was collected from farmers. This was followed by interviewing the commission agents, wholesalers, retailers and consumers to collect the information regarding marketing and value chain aspects. For the present study, 40 farmers, 10 commission agents, 10 traders and 10 retailers were selected.

The consumers' survey was conducted in Bengaluru city to study the consumers' preference for value added products of soybean. Simple random sampling method was adopted to select the respondents. In this random sampling method, respondents were selected randomly, irrespective of any characteristics. A sample of 80 consumers were selected across Bengaluru city.

Table 3.2: Composition of sample respondents for value chain mapping

Sl. No.	Respondents	Number
1.	Farmers	40
2.	Commission agents	10
3.	Traders	10
4.	Retailers	10
5.	Consumers	80
	Total	**150**

3.3 Nature and sources of data

The study was based both on primary as well as secondary data. The primary data were obtained from farmers, commission agents, wholesalers, retailers, processors and consumers using pre-tested schedule through personal interview for evaluating the objectives of the study. The data / information pertaining to socio-economic characteristics of sample respondents, cost and returns of soybean cultivation, value chain

mapping, marketing channels and consumers' preferences for value added products of soybean were collected from the sample respondents. The secondary data / information regarding arrivals and prices of soybean and other relevant information were collected from Bidar and Humanabad APMCs.

3.3.1 Period of study

The reference year for the study was 2017-18 and data / information was collected during March and April 2018.

3.4 Analytical tools and techniques

To fulfill the specific objectives of the study, based on the nature and extent of data, the following analytical tools and techniques were used.

3.4.1 Descriptive Statistics

3.4.2 Compound Growth Rate Analysis

3.4.3 Seasonal Indices

3.4.4 Value Chain Analysis

3.4.1 Descriptive Statistics

For the study, descriptive statistics such as mean, percentages and frequency distribution were used for analyzing the data.

3.4.2 Compound Growth Rate Analysis

The data on arrivals and prices of soybean for the last ten years, i.e., from 2007-08 to 2016-17 was obtained from the records of Bidar and Humanabad APMCs.

The Compound Annual Growth Rate (CAGR) is a useful measure of growth over multiple time periods. In the present study, the CAGR was used to analyse the trend in arrivals and prices of soybean in both the APMCs of Bidar district. The compound annual growth rate is arrived at as follows.

$$CAGR = (EV / BV)^{1/n} - 1$$

where,

EV = Ending value

BV = Beginning value

n = Number of periods (months, years, etc.)

3.4.3 Seasonal Indices

Seasonal indices were computed to analyse the seasonal variations in arrivals and prices of soybean crop in both the APMCs of Bidar district. Accordingly, data on arrivals and prices were collected for ten years period (from 2006-07 to 2016-17) and seasonal indices were worked out.

$$\text{Seasonal Index} = \frac{\text{Value for the season}}{\text{Seasonal average}}$$

3.4.4 Value Chain Analysis

Value chain analysis is a powerful tool to identify the key activities within the firm / industry which form the value chain for that organisation and have the potential of a sustainable competitive advantage for that firm / organisation.

The value chain for soybean from producer to consumer was mapped, including traders and commission agents. Prior to that, the identification of players in the soybean value chain was done using a generic worksheet crossing functions. The proposed mapping methodology drew primarily on secondary data supplemented with field interviews with enterprises through the value chain. The value chain map has been presented in a conventional format with the key stages in the value chain identified on the left of the map and associated enterprises at each stage to the right. The value chain mapping was conducted in two phases.

i. An initial basic map after the collection of initial data illustrating participants and functions; and

ii. Adjusted mapping, which is conducted following additional and follow-on interviews. The detail level of the map depends on mission objectives and requirements established at the outset.

IV RESULTS AND DISCUSSION

The results of the study are presented and discussed in this chapter under the following headings in consonance with the objectives of the study.

4.1 Cost and returns of soybean cultivation in Bidar district.

4.2 Arrivals and prices of soybean in Bidar and Humanabad APMCs.

4.3 Stakeholders in soybean sub-sector and value chain map of soybean.

4.4 Marketing channels of soybean in Bidar district.

4.5 Consumer preference for value added products of soybean in Bengaluru city.

4.1 Cost and returns of soybean cultivation in Bidar district

4.1.1 Socio-economic characteristics of soybean farmers in Bidar district

The sample for the study comprised of 40 soybean farmers. The socio-economic characteristics of soybean farmers are presented in Table 4.1. It is observed from the table that majority (45%) of the farmers belonged to the age group of above 50 years followed by age groups of 41 to 50 years (27.50 %), 31 to 40 years (20 %) and upto 30 years (7.50 %). This indicated that the farmers were highly experienced in farming activities in general and soybean cultivation in particular.

With regard to education level of farmers, it was found that about 32 per cent of them had education upto primary school level while another 32 per cent of them had education upto high school level. About 22 per cent of them had studied upto PUC followed by those (7.50 %) who were graduates. Five per cent of the farmers were illiterates. This indicated that majority (95 %) of the soybean farmers were literate which augments well for the farm economy.

Majority (72.50 %) of the farmers had nuclear families while the rest (27.50 %) were joint in nature. The phenomenon of nuclear family which is the order of the day in the present day modern world, especially in urban areas is also catching up in rural areas as endorsed by the findings of the present study. Majority (40 %) of the households had

Table 4.1: Socio-economic characteristics of soybean farmers in Bidar district

(n=40)

Sl. No.	Particulars	Number	Per cent
1.	**Age group (years)**		
	a) Upto 30	3	7.50
	b) 31 to 40	8	20.00
	c) 41 to 50	11	27.50
	d) Above 50	18	45.00
	Total	**40**	**100.00**
2.	**Education level**		
	a) Illiterate	2	5.00
	b) Primary school	13	32.50
	c) High school	13	32.50
	d) PUC	9	22.50
	e) Graduate	3	7.50
	Total	**40**	**100.00**
3.	**Family type**		
	a) Nuclear	29	72.50
	b) Joint	11	27.50
	Total	**40**	**100.00**
4.	**Family size (Nos.)**		
	a) Upto 4	16	40.00
	b) 5 to 7	15	37.50
	c) > 7	9	22.50
	Total	**40**	**100.00**
5.	**Occupation**		
	a) Agriculture as main occupation	32	80.00
	b) Agriculture as subsidiary occupation	8	20.00
	Total	**40**	**100.00**
6.	**Land holding**		
	a) Marginal (≤ 2.5 acres)	5	12.50
	b) Small (> 2.5-5 acres)	13	32.50
	c) Large (> 5 acres)	22	55.00
	Total	**40**	**100.00**

families of size upto four members followed by those (37.50 %) with size ranging from five to seven while the rest (22.50 %) had families with more than seven members.

Agriculture was the main occupation for majority (80 %) of the sample farmers while for the rest (20 %), it was a subsidiary occupation. The study area is predominantly an agriculture based economy and hence, agriculture was the main source of livelihood for most of the households.

In respect of land holdings, majority (55 %) of them had large holdings followed by small holdings (32.50 %) and marginal holdings (12.50 %). Generally, marginal farmers and small farmers constitute a major proportion of the farm households across the country. However, the findings of the present study do not endorse the situation at both the national level as well as the state level.

4.1.2 Cost of cultivation of soybean in Bidar district

The cost of cultivation of soybean in Bidar district is presented in Table 4.2. The total expenditure was classified into fixed costs and variable costs. The variable costs were further divided into material costs and labour costs. The material costs included items such as seeds, FYM, fertilizers and plant protection chemicals while the labour costs included the costs of land preparation, FYM application, sowing of seeds, application of fertilizers and plant protection chemicals, weedicide application and weeding, harvesting and machine labour.

The total cost of cultivation of soybean was about Rs. 31,906/- per acre, out of which variable costs and fixed costs accounted for about 79 per cent (Rs. 25,215.05/-) and 21 per cent (Rs. 6,691/-) respectively.

Among the variable costs, material costs accounted for about 48 per cent (Rs. 12,227.75/-) of the total variable costs (Rs. 25,215.05/-) while labour costs accounted for 47.09 per cent (Rs. 12,079.75/-) and interest on working capital for 3.59 per cent (Rs. 907.55/-).

Table 4.2: Cost of cultivation of soybean in Bidar district

(n=40)**;** (Rs./acre)

Sl. No.	Particulars	Soybean	
I.	**Material Costs**	**Quantity**	**Cost (Rs.)**
	a) Seeds (kgs)	40.38	1,030.25 (8.44)
	b) FYM (tonnes)	4.00	9,450.00 (77.28)
	c) Fertilizers (bags*)	1.01	1,165.00 (9.52)
	d) PPCs (ltrs.)	1.40	582.50 (4.76)
	Total Material Costs (A)	**46.79**	**12,227.75 (100.00)**
II.	**Labour Costs**	**Man days**	**Cost (Rs.)**
	a) Land preparation (machine)	2.42	1,712.75 (14.17)
	b) FYM application	0.77	539.00 (4.46)
	c) Sowing	2.85	1,995.00 (16.55)
	d) Fertilizer application	1.25	875.00 (7.24)
	e) PPC application	1.42	994.00 (8.22)
	f) Weedicide application and weeding	6.65	4,655.00 (38.53)
	g) Harvesting (machine)	1.87	1,309.00 (10.83)
	Total Labour Costs (B)		**12,079.75 (100.00)**
	Interest on working capital @ 7% (C)		**907.55**
	Total Variable Cost (A+B+C)		**25,215.05**
III.	**Fixed Costs**		
	a) Rental value of land		5,000.00 (74.74)
	b) Land revenue		20.00 (0.29)
	c) Depreciation		1,671.00 (24.97)
	Total Fixed Costs		**6,691.00 (100.00)**
	Total Cost		**31,906.05**

Note: Figures in parentheses are percentages to respective totals.

Each bag weighing 50 kgs.

The expenditure incurred towards the purchase of FYM was the highest (Rs. 9,450/-) accounting for about 77 per cent of the total material costs followed by fertilizers (9.52 %), seeds (8.44 %) and plant protection chemicals (4.76 %), etc. In the study area, FYM was adequately available on one hand and on the other; it was a relatively cheaper source of soil nutrients compared to chemical fertilizers. Moreover, the farmers were aware about the role of FYM in maintaining soil fertility in the long run. These reasons influenced the farmers in using FYM in appropriate quantities for soybean crop production. Therefore, FYM accounted for a major share in total material costs. In addition to FYM, some farmers also used chemical fertilizers in order to replenish the soil nutrients exhausted by crop production in the earlier seasons. Accordingly, the second major material cost was incurred on fertilizers. Seed, which is the most crucial input in any crop production activity, was the third major material cost in soybean production. Though, soybean a hardy crop and relatively more resistant to pests and diseases, also called for application of PPCs to ward off soybean-specific pests and diseases. Hence, the fourth important material cost was incurred on pesticides.

Among the labour costs, the expenditure incurred towards wages for weedicide application and weeding purpose was the highest (Rs. 4,655) accounting for 38.53 per cent of the total labour costs (Rs. 12,079.75) followed by wages paid for activities, namely, sowing (16.55 %), land preparation (14.17 %), harvesting (10.83 %), PPC application (8.22 %), fertilizer application (7.24 %) and FYM application (4.46 %). In any crop, be it irrigated or rainfed, weeds are common and soybean is no exception to it. Therefore, the farmers had to resort to application of weedicides and do weeding operations in order to keep a check on the impact of weeds on soybean crop yield. This necessitated the farmers to employ labour in adequate quantities and accordingly, the cost incurred was the major one among all labour costs.

In the case of soybean crop, the seeds are sown manually which called for employment of adequate labour for the activity. Accordingly, the labour cost incurred towards sowing activity was the second major cost among labour costs. For land preparation activities, the farmers used machine labour (tractor) and there was no incidence of use of bullock labour. Even in the case of harvesting, the farmers resorted to

use of machine labour (combine harvester). Thus, the labour costs pertaining to land preparation and harvesting stood at third and fourth positions respectively, among all labour costs. The farmers also had to employ labour for applying PPC, fertilizers and FYM for the crop and accordingly, these were the other labour costs incurred in soybean crop production.

Among the fixed costs, the rental value of land was the highest (Rs. 5,000/-) accounting for about 75 per cent of the total fixed costs followed by depreciation (24.97 %) and land revenue (0.29 %).

4.1.3 Yield and returns from soybean cultivation

Table 4.3 presents the yield and returns from soybean cultivation. The per acre yield of sample farmers ranged from 9 to 14 quintals and the average yield was 10.50 quintals per acre. The farmers with relatively low marketable surplus sold soybean to village merchants while those with relatively high marketable surplus sold to traders through commission agents in APMCs. Accordingly, the price realized by the farmers ranged from Rs. 2,800/- to Rs. 3,500/- per quintal and the average price was Rs. 3,275/- per quintal.

The gross returns amounted to Rs. 34,387/- per acre and the corresponding net returns was Rs. 2,481/- per acre. Hence, the null hypothesis that "cultivation of soybean is profitable" has been accepted.

Tiwari and Sushant (2012) analysed the costs, returns and resource-use efficiency of soybean cultivation in Indore district of Madhya Pradesh reported that the per hectare cost of cultivation of soybean was estimated at Rs. 30,740.85/-, Rs. 28,466.26/- and Rs. 29,587.43/- on small, large and pooled farms, respectively, thereby exhibiting inverse relationship with the size of the farm. The cost of producing a quintal of soybean showed direct relationship with the size of the holding as it was Rs. 1,727/- on small farms, Rs. 1,848.45/- on large farms and Rs. 1,793.20/- on pooled farms. The net income decreased from Rs. 13,342.47/- on small farms to Rs. 8,986.56/- on large farms while it was Rs. 10,999.42/- for pooled farms.

Table 4.3: Yield and returns from soybean cultivation

(n=40)

Sl. No.	Particulars	Value
1.	Yield (quintals / acre)	10.50
2.	Price (Rs. / quintal)	3,275.00
3.	Gross returns (Rs. / acre)	34,387.50
4.	Total cost (Rs. / acre)	31,906.05
5.	Net returns (Rs. / acre)	2,481.00

Note: The soybean crop season is from July to September

Agarwal and Singh (2014) in their study on economics of soybean cultivation in Narsinghpur district of Madhya Pradesh indicated that the average per hectare gross return from soybean was found to be Rs. 43,179.59/- and the cost of production per quintal of soybean was Rs. 1,354.92/-. The benefit cost ratio was 1.76 in the case of small farmers while it was 1.74 in the case of medium and large farmers.

4.2 Arrivals and prices of soybean in Bidar and Humanabad APMCs

4.2.1 Socio-economic characteristics of commission agents of Bidar and Humanabad APMCs

The socio-economic characteristics of sample commission agents of Bidar and Humanabad APMCs are presented in Table 4.4. Majority (40 %) of the commission agents belonged to the age group of 36-45 years followed by age groups of above 55 years and upto 35 years with 30 per cent each. This may be due to the reason that age and experience also matters in trading activities.

The education level of commission agents indicated that majority (50 %) of them had studied upto SSLC followed by those (30 %) who had studied upto PUC while 20 per cent of them were graduates. There were no illiterates among them. This indicated that the education level of commission agents was fair enough and they possessed the knowledge required for trading activities.

With respect to experience in trading, majority (50 %) of them had more than 10 years of experience as commission agent followed by those with upto five years (30 %) and six to ten years (20 %). This indicated that most (70 %) of the commission agents had fair amount of working experience as they were in this field since at least six years.

Majority (60 %) of the commission agents handled more than 50 quintals of soybean per season while the rest (40 %) of them handled less than 50 quintals per season.

Table 4.4: Socio-economic characteristics of sample commission agents of Bidar and Humanabad APMCs

(n=10)

Sl. No.	Particulars	Number	Per cent
1.	**Age group (years)**		
	a) Upto 35	3	30.00
	b) 36-45	4	40.00
	c) Above 55	3	30.00
	Total	**10**	**100.00**
2.	**Literacy level**		
	a) Upto SSLC	5	50.00
	b) Upto PUC	3	30.00
	c) Graduate	2	20.00
	Total	**10**	**100.00**
3.	**Experience in trading (years)**		
	a) Upto 5	3	30.00
	b) 6-10	2	20.00
	c) Above 10	5	50.00
	Total	**10**	**100.00**
4.	**Quantity of soybean handled per season (quintals)**		
	a) Upto 50	4	40.00
	b) Above 50	6	60.00
	Total	**10**	**100.00**

4.2.2 Socio-economic characteristics of traders of Bidar and Humanabad APMCs

The socio-economic characteristics of sample traders of Bidar and Humanabad APMCs are presented in Table 4.5. Forty per cent of the traders belonged to the age group of upto 35 years while another 40 per cent of them belonged to the age group of 36-45 years. The rest (20 %) were aged above 55 years. As mentioned earlier, this may be due to the reason that age and experience also matters in trading activities.

The education level of traders indicated that majority (40 %) of them had studied upto PUC followed by those who had studied upto SSLC and graduation, with 30 per cent each. There were no illiterates among them. This indicated that the education level of traders was also fair enough and they also possessed the knowledge required for trading activities.

With respect to experience in trading, majority (50 %) of them had more than 10 years of experience followed by those with six to ten years (40 %) and upto five years (10%). This indicated that most (90 %) of the traders had good amount of working experience as they were in this field since at least six years.

Majority (70 %) of the traders traded more than 50 quintals of soybean per season while the rest (30 %) of them traded less than 50 quintals per season. This indicated the predominance of large traders in soybean trade.

4.2.3 Trend in arrivals and prices of soybean in Bidar and Humanabad APMCs

The trend in arrivals and prices of soybean in Bidar and Humanabad APMCs were analysed by computing Compound Annual Growth Rate (CAGR) for the period from 2007-08 to 2016-17. Table 4.6 presents the trend in arrivals and prices of soybean in Bidar APMC. The arrivals of soybean to Bidar APMC ranged from 674 quintals in 2009-10 to 99,484 quintals in 2013-14. The arrivals registered CAGR of 44.52 per cent for the reference period. The acreage under soybean in Bidar district has been increasing over the years. This is mainly due to fact that the market demand for soybean is increasing over the years due to its multifarious usage. In fact, most of the soybean produced in the study area is shipped to Maharashtra state, where it is further processed into various

Table 4.5: Socio-economic characteristics of sample traders of Bidar and Humanabad APMCs

(n=10)

Sl. No.	Particulars	Number	Per cent
1.	**Age group (years)**		
	a) Upto 35	4	40.00
	b) 36-45	4	40.00
	c) Above 55	2	20.00
	Total	**10**	**100.00**
2.	**Education level**		
	a) Upto SSLC	3	30.00
	b) Upto PUC	4	40.00
	c) Graduate	3	30.00
	Total	**10**	**100.00**
3.	**Experience in trading (years)**		
	a) Upto 5	1	10.00
	b) 6-10	4	40.00
	c) Above 10	5	50.00
	Total	**10**	**100.00**
4.	**Quantity of soybean traded per season (quintals)**		
	a) Upto 50	3	30.00
	b) Above 50	7	70.00
	Total	**10**	**100.00**

Table 4.6: Trend in arrivals and prices of soybean in Bidar APMC

Sl. No.	Year	Arrivals (qtls.)	Prices (Rs. / qtl.)
1.	2007-08	2,468	1,502
2.	2008-09	6,589	1,590
3.	2009-10	674	2,221
4.	2010-11	8,591	1,930
5.	2011-12	34,050	1,985
6.	2012-13	56,441	3,066
7.	2013-14	99,482	2,956
8.	2014-15	33,114	3,215
9.	2015-16	56,616	3,500
10.	2016-17	98,130	2,650
	CAGR* (%)	**44.52**	**5.84**

Note: * CAGR – Compound Annual Growth Rate

CAGR was computed for the period from 2007-08 to 20016-17

products. The increased acreage in Bidar taluk has resulted in increased production which in turn has resulted in increased arrivals to the APMC. The highest price of Rs. 3,500/- per quintal was observed during 2015-16 while the lowest price of Rs.1,502/- per quintal was in 2007-08. The prices of soybean recorded CAGR of 5.84 per cent for the reference period. This is quite obvious, as generally, prices of most agricultural commodities increase with time.

Table 4.7 presents the trend in arrivals and prices of soybean in Humanabad APMC. The arrivals of soybean to Humanabad APMC ranged from 215 quintals in 2009-10 to 17,150 quintals in 2016-17. The arrivals registered CAGR of 53.90 per cent for the reference period. As mentioned earlier, the acreage under soybean in Bidar district has been increasing over the years due to robust market demand, especially from processing units located in Maharashtra state. The increased acreage in Humanabad taluk also led to increased production thereby contributing to increased arrivals to the APMC. The highest price of Rs. 3,600/- per quintal was observed during 2015-16 while the lowest price of Rs. 1,500/- per quintal was in 2007-08. The prices of soybean recorded CAGR of 7.52 per cent for the reference period. As mentioned earlier, this is quite obvious, as generally, prices of most agricultural commodities increase with time.

Hence, the null hypothesis that "there is an increasing trend in both arrivals and prices of soybean in Bidar and Humanabad APMCs" has been accepted.

Benke *et al.* (2010) in their study on arrivals and prices of soybean in Akola district of Maharashtra state reported that the arrivals of soybean to Akola market registered a CAGR of 27.40 for the period from 1987 to 2006.

4.2.4 Seasonal Indices of arrivals and prices of soybean in Bidar and Humanabad APMCs

In addition to CAGR, the seasonal indices were computed for arrivals and prices of soybean in Bidar and Humanabad APMCs. The seasonal indices of arrivals and prices of soybean in Bidar APMC are presented in Table 4.8. The arrivals of soybean to Bidar APMC were confined to the months of October, November and December. This is

Table 4.7: Trend in arrivals and prices of soybean in Humanabad APMC

Sl. No.	Year	Arrivals (qtls.)	Prices (Rs. / qtl.)
1.	2007-08	230	1,500
2.	2008-09	2,100	1,600
3.	2009-10	215	2,100
4.	2010-11	1,735	2,000
5.	2011-12	6,176	2,000
6.	2012-13	4,546	3,000
7.	2013-14	8,461	2,600
8.	2014-15	8,875	2,800
9.	2015-16	8,513	3,600
10.	2016-17	17,150	3.100
	CAGR* (%)	**53.90**	**7.52**

Note: * CAGR – Compound Annual Growth Rate

CAGR was computed for the period from 2007-08 to 20016

Table 4.8: Seasonal Indices of arrivals and prices of soybean in Bidar APMC

Sl. No.	Month	Arrivals	Price
1.	January	0	0
2.	February	0	0
3.	March	0	0
4.	April	0	0
5.	May	0	0
6.	June	0	0
7.	July	0	0
8.	August	0	0
9.	September	0	0
10.	October	549.96	351.26
11.	November	538.70	401.68
12.	December	111.32	447.04

Note: Reference period - 2007-08 to 2016-17

because in Bidar district, soybean is grown only as a kharif crop. It is generally sown during the month of July and harvested during the month of September. Hence, the market arrivals were peak in October followed by November and December. Accordingly, the seasonal index was highest (549.96) for the month of October followed by the months of November (538.70) and December (111.32). The price of any commodity especially that of agricultural commodity is inversely related with its supply in the market and the same was observed in the case of soybean in Bidar APMC. The soybean prices were lowest during the month of October while they were highest during the month of December. Accordingly, the price index was lowest (351.26) for October month and highest (447.04) for December month.

The seasonal indices of arrivals and prices of Humanabad APMC are presented in Table 4.9. In the case of Humanabad APMC, the arrivals of soybean were spread over seven months, from September to March. As mentioned earlier, soybean is grown only during kharif season in Bidar district. However, in Humanabad taluk, some farmers sow relatively early while some farmers sow relatively late when compared to soybean farmers of Bidar taluk. Hence, the soybean crop season of Humanabad taluk is spread over a longer period when compared to that of Bidar taluk. As a consequence, the soybean arrivals to Humanabad APMC commence in September and terminate by March. The seasonal index was highest (810.44) for the month of October while it was the lowest (1.45) for March. The soybean prices were lowest during the month of February while they were the highest during the month of October. Accordingly, the price index was highest (234.13) for the month of October while it was lowest (64.28) for February month. However, no inverse relationship between arrivals and prices of soybean was observed in Humanabad APMC.

Benke *et al.* (2010) in their study on arrivals and prices of soybean in Akola district of Maharashtra state reported that the seasonal indices for soybean arrivals was highest (387) for the month of November while it was lowest (19.51) for July. In the case of prices, the index was the highest (106.77) for the month of June while it was lowest (93.25) for February.

Table 4.9: Seasonal Indices of arrival and prices of soybean in Humanabad APMC

Sl. No.	Month	Arrivals	Price
1.	January	18.92	162.84
2.	February	5.98	64.28
3.	March	1.45	138.91
4.	April	0	0
5.	May	0	0
6.	June	0	0
7.	July	0	0
8.	August	0	0
9.	September	17.98	155.71
10.	October	810.44	234.13
11.	November	290.53	233.31
12.	December	54.68	210.79

Note: Reference period - 2007-08 to 2016-17

Bodade *et al.* (2016) in their study on arrival and price behaviour of soybean in major markets of Madhya Pradesh reported that the prices of soybean were higher in the months of June, July and August in all the selected markets. The cyclical variation was observed in the prices of soybean for all the selected markets.

4.3 Stakeholders in soybean sub-sector and value chain map of soybean

Most products change hands many times before they reach the final consumer. Input suppliers, producers, wholesalers, processors and retailers market the product, adding to its value at each step in the process. The value chain refers to this range of activities that brings a product or a service from its conception to its end use in a particular industry.

A value chain is a sequence of target-oriented combinations of production factors that create a marketable product from its conception to the final consumption. In soybean value chain, the major actors / players involved include producers, wholesalers (soybean and / or value-added products of soybean), processors, retailers (soybean and / or value-added products of soybean) and consumers.

4.3.1 Socio-economic characteristics of sample retailers in Bidar district

The socio-economic characteristics of sample retailers are presented in Table 4.10. Majority (50 %) of the retailers belonged to the age group of upto 35 years followed by age group of 36-45 years (30 %) and above 45 years (20 %). This indicated that the sample retailers were relatively young when compared to their counterparts, i.e., sample commission agents and sample traders.

The education level of retailers indicated that majority (60 %) of them had studied upto PUC followed by those (30 %) who had studied upto SSLC while 10 per cent of them were graduates. There were no illiterates among retailers. Perhaps, the educational background of the retailers facilitated them to do their retailing business better.

With respect to years of experience in retailing, majority (50 %) of them had six to ten years of experience as retailer followed by those with above 10 years (30 %) and

Table 4.10: Socio-economic characteristics of sample retailers in Bidar district

(n=10)

Sl. No.	Particulars	Number	Per cent
1.	**Age group (years)**		
	a) Upto 35	5	50.00
	b) 36-45	3	30.00
	c) Above 45	2	20.00
	Total	**10**	**100.00**
2.	**Education level**		
	a) Upto SSLC	3	30.00
	b) Upto PUC	6	60.00
	c) Graduate	1	10.00
	Total	**10**	**100.00**
3.	**Experience in trading (years)**		
	a) Upto 5	2	20.00
	b) 6-10	5	50.00
	c) Above 10	3	30.00
	Total	**10**	**100.00**
4.	**Quantity of soybean traded per year (quintals)**		
	a) Upto 1	6	60.00
	b) Above 1	4	40.00
	Total	**10**	**100.00**

upto five years (20 %). This indicated that most (80 %) of the retailers had good amount of working experience as they were in this field since at least six years.

Majority (60 %) of the retailers traded upto one quintal of soybean per year while the rest (40 %) of them traded above one quintal per year. This is because soybean as such is not consumed in large quantities by consumers at the household level.

4.3.2 Soybean value chain map

4.3.2.1 Identification of soybean value chain actors

The identification of soybean actors / players was done using a generic worksheet crossing functions, which is presented in Table 4.11. Completing the model table greatly facilitated drafting the soybean value chain map. It may be noted that an actor can accomplish more than one function. The table was completed by filling the participants / actors / players according to their functions and markets and presented as block forms with inserted text in each entry in the value chain map. If participants / actors / players are involved in more than one function or market, the block was extended to reach the relevant functions / markets.

4.3.2.2 Mapping the soybean value chain

The proposed mapping methodology drew primarily on secondary data supplemented with field interviews with enterprises through the value chain. The value chain map has been presented in a conventional format with the key stages in the value chain identified on the left of the map and associated enterprises at each stage to the right. The value chain map of soybean is depicted in Fig. 2. The channels are generally vertical chain of enterprises that transform raw materials and deliver them to consumers as finished goods. The map lists functions vertically along the left-hand side with the final markets across the top. The participants / actors / players of the value chain are designated by boxes.

In the soybean map, the channels have been identified on the basis of core business units, i.e., the supply, production and distribution involving physical product

Table 4.11: Generic worksheet for various stakeholders in soybean value chain

Functions	Stakeholders / Actors / Players				
	Farmers	**Commission Agents**	**Processors**	**Wholesalers**	**Retailers**
Producing					
Processing					
Packaging					
Transportation					
Wholesaling					
Retailing					

flow from supplier to the end-user. In general, the more the units are integrated, the more competitive advantage they gain and more capital-intensive they are. The missing linkages between the players are represented by dotted lines. There is no efficient value chain for soybean in the study area because of poor linkages between the players due to various reasons.

4.3.2.3 Functions and actors in soybean value chain

The soybean value chain map depicts the principal relationships in the soybean sub-sector in the study area. The value chain map provides a graphic representation of the structure of the value chain showing how products flow through the primary system as well as alternative channels as depicted in Fig. 3. The participants or actors of the value chain are designated by boxes so that they can be easily identified; and other players and activities are presented differently. The information and support activities between the players are represented by dotted lines. The actors in the value chain include input suppliers, producers, commission agents, traders, processors, retailers, wholesalers and consumers.

Input Suppliers

The input suppliers include Government distributors, fertilizer companies, wholesalers; and even small retail shops that sell small quantities of seeds, fertilizers and pesticides to farmers at the village level.

Farmers

Two types of soybean production system can be observed, viz., small scale commercial production and large scale commercial production.

The small and large-scale commercial farmers sell most of their produce to various market intermediaries. The producers generally deal with commission agents, wholesalers and processors (value chain map). In most cases, farmers depend on village level traders for price information. However, due to easy access to communication technology, big farmers generally have access to market information to some extent.

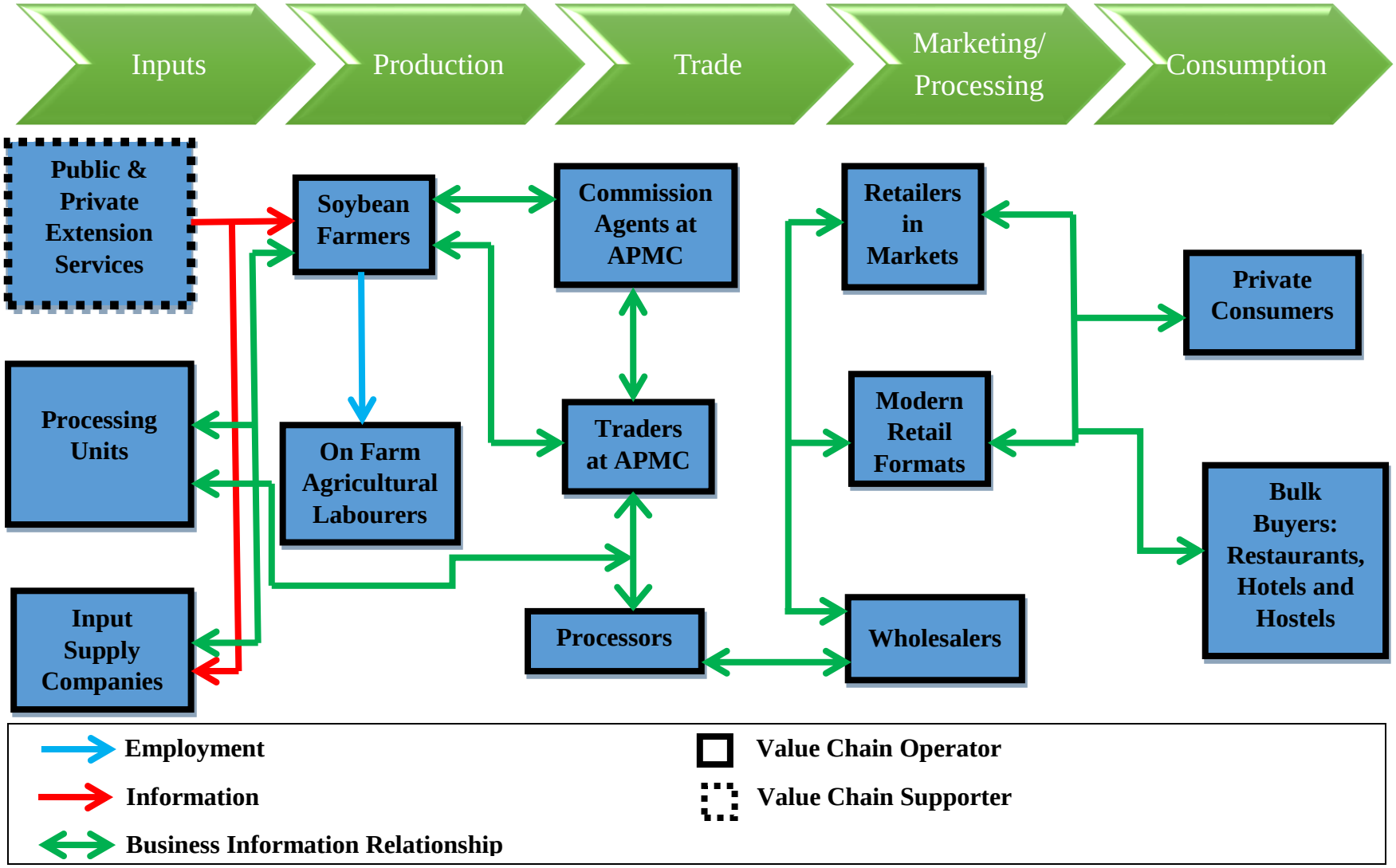

Fig. 2: Soybean Value Chain Map

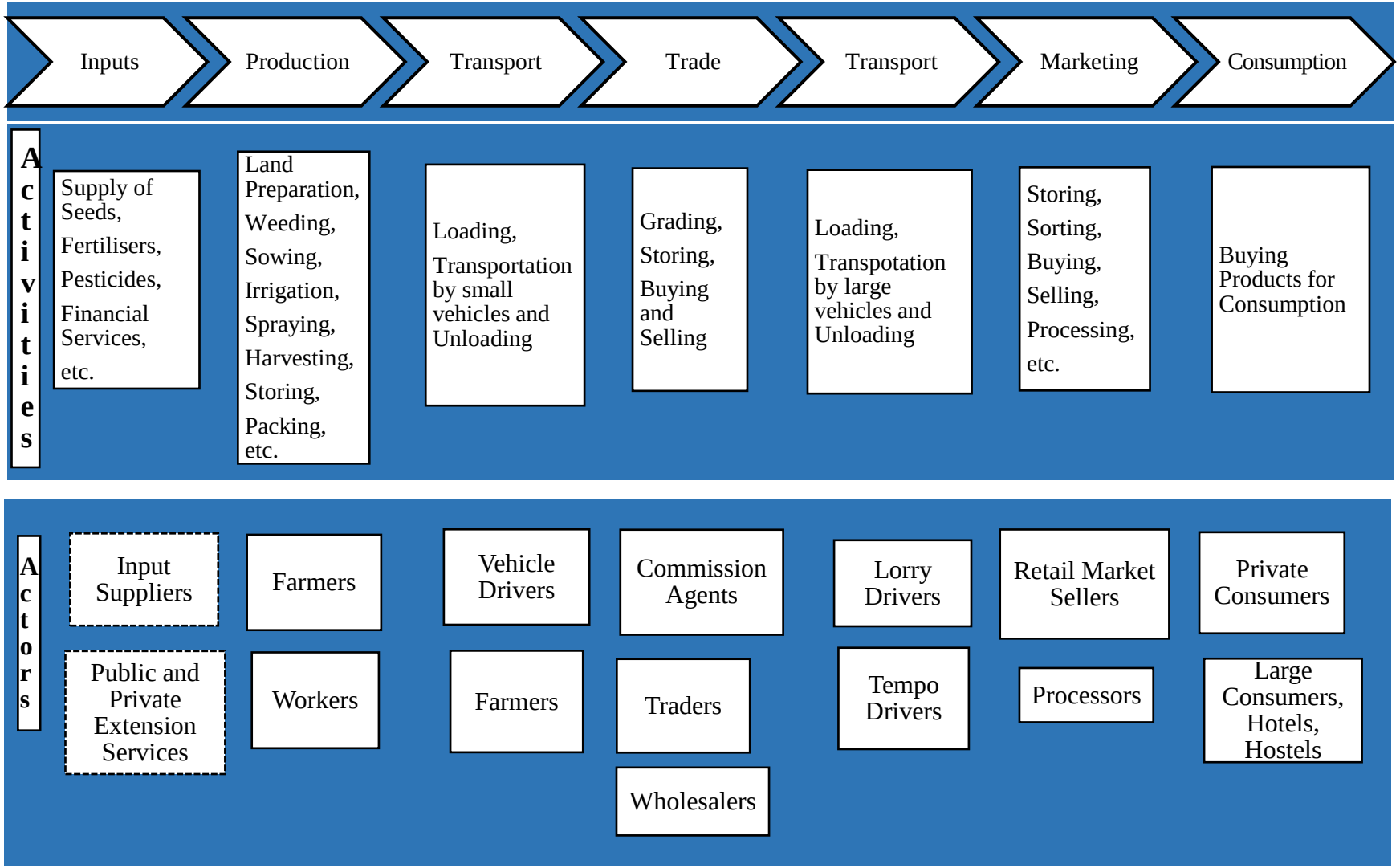

Fig. 3: Soybean Value Chain – Actors and their Activities

Commission Agents

Commission agent is a person who, on behalf of his principal and in consideration of commission upon the amount involved in each transaction, keeps in his custody the goods of his principal and sells the same and holds himself liable to deliver to the buyer and to make payments of its price to his principal. He is a licensed market functionary in APMC.

The commission agents play vital role in the marketing of soybean by providing link between producers and buyers. Usually, commission agents did not take the ownership of the product but arranged for sale on behalf of the owners and they acted only on commission and bore no risk. For this service, they charged 12 per cent commission on the total sale value. The farmers reported that delayed payment by commission agents was one of the problems in trading soybean.

The field survey and interaction with the value chain actors indicated that all marginal, small and large farmers are involved in soybean production. In the case of marginal farmers, generally, household labour is utilised for soybean production while hired labour is used by small and big farmers.

Local Traders

The local traders are directly involved in buying and selling soybean from different remote district towns or markets and sell to the wholesalers at a profit. They often work as commission agents of the large wholesalers.

Wholesalers

The wholesalers deal with large volumes of produce by purchasing either from local traders or farmers. They invest and transact large amount of money in their business and often control the market prices.

Processors

The processors from Maharashtra state procure most of the soybean produced in Bidar district. The processed products are sold to wholesalers, which in turn reaches retailers to reach final consumers.

Retailers

The retailers buy unprocessed soybean from the farmers or wholesalers and processed products from the processors through their distributors and sell directly to the consumers.

4.4 Marketing channels of soybean

In the present study, an attempt was made to track the marketing channel of soybean as long as it was possible. Since, the traders after purchasing the produce, traded the same to processors, it was not possible to trace the entire channel. Accordingly, three channels were identified. Table 4.12 presents the marketing channels of soybean in the study area. They are as follows.

Channel I: Producer → Village Merchant → Commission Agent → Trader → Processor → Wholesaler → Retailer → Consumer

Channel II: Producer → Processor → Wholesaler → Retailer → Consumer

Channel III: Producer → Commission Agent → Trader → Processor → Wholesaler → Retailer → Consumer

Majority (67.50 %) of the soybean farmers preferred marketing channel III to sell their produce followed by those (32.50 %) who preferred marketing channel II while the rest (5.04 %) preferred marketing channel I. However, most (55.10 %) of the produce

Table 4.12: Marketing Channels of soybean in Bidar district

(n=40)

Sl. No.	Marketing Channel	No. of farmers*	Total quantity sold (quintals)**	Average quantity sold (quintals)	Price realised by farmers (Rs. / quintal)
1.	Channel I	8 (20.00)	112.00 (5.04)	14.00	2,837
2.	Channel II	13 (32.50)	1224.00 (55.10)	94.15	3,593
3	Channel III	27 (67.50)	885.50 (39.86)	32.79	3,274
		-	**2221.50 (100.00)**	**55.54**	-

Note: *****Multiple response

**Figures in parentheses indicate percentages to column total

Channel I: Producer → Village Merchant → Commission Agent → Trader → Processor → Wholesaler → Retailer → Consumer

Channel II: Producer → Processor → Wholesaler → Retailer → Consumer

Channel III: Producer → Commission Agent → Trader → Processor → Wholesaler → Retailer → Consumer

was sold through channel II while about 40 per cent of the produce was sold through channel III. The price realised by the farmers was highest (Rs. 3,593/- per quintal) in channel II followed by channel III (Rs. 3,274/- per quintal) and channel I (Rs. 2,837/- per quintal).

Most of the soybean farmers in the study area found it convenient to sell their produce in APMCs through commission agents, i.e., channel II. However, some farmers, especially large farmers had established contacts with processors of Maharashtra state and accordingly, preferred to sell to them thereby realising relatively higher prices when compared to that realised in APMCs. The farmers with low marketable surplus preferred to sell their produce to village merchants, i.e., channel I. Since, the produce was sold at the village level itself, the farmers realised relatively lower prices when compared to the prices realised in the other two channels.

Hence, the null hypothesis that "about 25 per cent of the soybean produced is disposed off at the village level" has been rejected.

Chavhal *et al.* (2014) in their study on marketing cost, marketing margin and price spread of soybean in Parbhani district of Maharashtra state observed three types of marketing channels, viz., producer - village merchant - wholesaler- oil processor (channel I); producer - wholesaler - oil processor (channel II); and producer - oil processor channel III). The maximum quantity of soybean was sold through channel II. The marketing cost was highest in channel I and lowest in channel III. The producer's share in consumer rupee was highest (98.83 %) in channel III while it was lowest (83.14 %) in channel I.

4.5 Consumer preference for value added products of soybean in Bengaluru city

4.5.1 Socio-economic characteristics of consumers of value-added products of soybean in Bengaluru city

The socio-economic characteristics of consumers of value-added products of soybean in Bengaluru city are presented in Table 4.13. Majority (52.50 %) of the respondents belonged to the age group of 31-50 years followed by age groups of upto 30 years (27.50 %) and above 50 years (20 %).

The education level of respondents indicated that majority (48.75 %) of them were graduates followed by those (36.25 %) who had studied upto post graduation while about 11 per cent of them had studied upto PUC and the rest (3.75 %) of them had studies upto SSLC. There were no illiterates among the respondents. Since, the study was undertaken in Bengaluru city, it is quite obvious that all the sample respondents were literates.

Majority (46.25 %) of the consumers had monthly household income ranging from Rs. 50,000/- to 1,00,000/- followed by those (43.75 %) with income of upto Rs. 50,000/- while the rest (10 %) of them had income above Rs. 1,00,000/-. Bengaluru is a metropolitan city and the cost of living has an influence on the income levels of the residents of the city.

With regard to family type, it was found that majority (77.50 %) of the consumers had nuclear families while the rest (22.50 %) were joint in nature. As mentioned earlier, in the present day modern world, nuclear family is the order of the day and this has been endorsed by the findings of the present study.

With respect to the monthly expenditure on value added products of soybean, it was found that majority (46.25 %) of them spent above Rs. 500/- on soybean products followed by those (37.5 %) who spent upto Rs. 300/- while the rest (16.25 %) of them incurred expenditure ranging from Rs. 300/- to 500/- per month.

Majority (57.50 %) of the respondents were employed in private sector followed by Government employees (23.75 %) while the rest (18.75 %) were self-employed. This may be due to the fact that the private sector employees were relatively more aware about the range of value-added products of soybean when compared to Government employees and those who were self-employed.

With regard to the food habit of the consumers it was found that majority (63.75 %) of them were non-vegetarians while the rest (36.25 %) of them were vegetarians. This may be attributed to the fact that due to increasing urbanization and consumerism, tastes

Table 4.13: **Socio-economic characteristics of consumers of value-added products of soybean in Bengaluru city**

(n=80)

Sl. No.	Particulars	Number	Per cent
1.	**Age group (years)**		
	a) Upto 30	22	27.50
	b) 31-50	42	52.50
	c) Above 50	16	20.00
	Total	**80**	**100.00**
2.	**Education level**		
	a) Upto SSLC	3	3.75
	b) Upto PUC	9	11.25
	c) Graduate	39	48.75
	d) Post graduate	29	36.25
	Total	**80**	**100.00**
3.	**Monthly household income (Rs.)**		
	a) Upto 50,000	35	43.75
	c) 50,001-1,00,000	37	46.25
	d) Above 1,00,000	8	10.00
	Total	**80**	**100.00**
4.	**Family type**		
	a) Nuclear	62	77.50
	b) Joint	18	22.50
	Total	**80**	**100.00**
5.	**Monthly expenditure on soybean products (Rs.)**		
	a) Upto 300	30	37.50
	b) 300-500	13	16.25
	c) Above 500	37	46.25
	Total	**80**	**100.00**
6.	**Profession**		
	a) Government employees	19	23.75
	b) Private sector employees	46	57.50
	c) Self-employed	15	18.75
	Total	**80**	**100.00**
7.	**Food habit**		
	a) Vegetarian	29	36.25
	b) Non-vegetarian	51	63.75
	Total	**80**	**100.00**

and preferences are changing thick and fast. With time, people are changing their food habits in favour of non-vegetarian food.

4.5.2 Consumer preference for value added products of soybean in Bengaluru city

The consumer preference for value added products of soybean in Bengaluru city is presented in Table 4.14. The range of value-added products of soybean preferred by the sample consumers included oil, chunks, sauce, noodles, granules, flour, milk shake, paneer, chips and dosa batter. Among these products, majority (70 %) of the consumers preferred chunks followed by oil (65 %), sauce (44 %), flour (20 %), etc. while the remaining products were preferred by very few consumers. The soybean chunks are generally used with other food items to enhance taste and hence were preferred by most of the consumers. The soybean oil is considered as a functional food as it has health benefits. Therefore, it was the second most preferred soybean product among consumers. The third most preferred product was soybean sauce as households used it for preparing various dishes, especially Chinese dishes and non-vegetarian dishes.

Hence, the null hypothesis that "the most preferred value-added product of soybean among consumers is soy chunks" has been accepted.

Table 4.15 presents the brand-wise consumer preference for soybean oil in Bengaluru city. Majority (61.54 %) of the consumers preferred Gemini brand followed by Fortune (36.54 %) and Dhara (1.92 %). The consumers' preference for any product is greatly influenced by quality brands and the same was true in the case of soybean oil as Gemini and Fortune are well established brands in the market.

The brand-wise consumer preference for soybean chunks in Bengaluru city is presented in Table 4.16. Majority (60.73 %) of the consumers preferred Nutrela brand followed by those (30.35 %) who preferred BB Royal brand and the rest (8.92 %) preferred unbranded soybean chunks. As mentioned earlier, quality brands are preferred by consumers and this might have contributed to the popularity of Nutrela and BB Royal brands.

Table 4.14: Consumer preference for value added products of soybean in Bengaluru city

(n=80)

Sl. No.	Product	Number*	Per cent
1.	Chunks	56	70.00
2.	Oil	52	65.00
3.	Sauce	44	55.00
4.	Flour	16	20.00
5.	Granules	5	6.25
6.	Paneer	4	5.00
7.	Noodles	3	3.75
8.	Milk shake	2	2.50
9.	Chips	1	1.25
10.	Dosa batter	1	1.25

Note: (*) Multiple responses

Table 4.15: Brand-wise consumer preference for soybean oil in Bengaluru city

Sl. No.	Brand	Number	Per cent
1.	Gemini	32	61.54
2.	Fortune	19	36.54
3.	Dhara	1	1.92
	Total	**52**	**100.00**

Table 4.16: Brand-wise consumer preference for soybean chunks in Bengaluru city

Sl. No.	Brand	Number	Per cent
1.	Nutrela	34	60.73
2.	BB Royal	17	30.35
3.	Unbranded	5	8.92
	Total	**56**	**100.00**

Table 4.17 presents the brand-wise consumer preference for soybean sauce in Bengaluru city. Majority (34.09 %) of the consumers preferred Pantai brand followed by Healthy Boy (25 %), Premium Dark (13.66 %), Ching's Secrer (11.36 %), etc. As mentioned earlier, the popularity of any brand is mainly due to its quality and accordingly, this has influenced the consumers' preference for brands of soybean sauce.

Table 4.17: Brand-wise consumer preference for soybean sauce in Bengaluru city

Sl. No.	Brand	Number	Per cent
1.	Pantai	15	34.09
2.	Healthy Boy	11	25.00
3.	Premium Dark	6	13.66
4.	Ching's Secrer	5	11.36
5.	Byravi	3	6.81
6.	WHO HUP	3	6.81
7.	Nutty	1	2.27
	Total	**44**	**100.00**

V SUMMARY AND IMPLICATIONS

Soybean (*Glycine max*) also called soja bean or soya bean, is an annual legume of the pea family (Fabaceae) and is an edible seed. The soybean is economically the most important bean in the world, providing vegetable protein for millions of people and ingredients for hundreds of chemical products. Soybean is known as the "Golden Bean" of twentieth century. Soybean is gaining popularity on account of its unique characteristics and adaptability to varied agro-climatic conditions.

A 'Value Chain' is a sequence of target-oriented combinations of production factors that create a marketable product or service from its conception to the final consumption. This includes activities such as design, production, marketing, distribution and support services up to the final consumer. In simple terms, the term 'Value Chain' refers to the fact that value is added to preliminary products through the combination with other resources (for example, tools, manpower, knowledge and skills, other raw materials or preliminary products). As the product passes through several stages of the value chain, the value of the product increases.

The value chain analysis for soybean will help in identifying the actors involved in the value chain. Value chain mapping basically uses a participant worksheet which includes production, assembling, processing, wholesaling, retailing and consumption. These elements help to organise key information about the role of each participant in the value chain. It also identifies the potential opportunities for upgrading the value chain and to open up those opportunities. It also suggests strategies to improve the marketing of soybean.

The specific objectives of the study are:

1. To estimate the cost and returns of soybean cultivation.
2. To analyse the trend in arrivals and prices of soybean in Bidar and Humanabad APMCs.

3. To identify the various stakeholders in soybean sub-sector and map the value chain.
4. To analyse the marketing channels of soybean.
5. To analyse the consumer preference for value added products of soybean.

5.1 Methodology

5.1.1 Sampling framework

The study area was Bidar district of Karnataka. For the study, 40 farmers, 10 traders, 10 wholesalers and 10 retailers were drawn to collect information pertaining to soybean cultivation, value chain aspects and marketing. In addition, 80 consumers were drawn from Bengaluru city to study the consumer preference for value added products of soybean.

5.1.2 Database

The results of the study are based on both primary and secondary data. For evaluating the objectives of the study, necessary data relating to soybean cultivation, value chain aspects, marketing and consumers' preference for value added products of soybean were obtained from the sample respondents. The relevant secondary information was also collected from Bidar and Humanabad APMCs.

5.1.3 Analytical techniques

To analyse the objectives of the study, descriptive statistics such as averages, percentages, etc., compound growth rate analysis and value chain mapping were used.

5.2 Major findings of the study

a) The total cost of cultivation of soybean was about Rs. 31,906/- per acre, out of which variable costs and fixed costs accounted for about 79 per cent (Rs. 25,215.05/-) and 21 per cent (Rs. 6,691/-) respectively.

b) Among the variable costs, material costs accounted for about 48 per cent (Rs. 12,227.75/-) of the total variable costs (Rs. 25,215.05/-) while labour costs

accounted for 47.09 per cent (Rs. 12,079.75/-) and interest on working capital for 3.59 per cent (Rs. 907.55/-).

c) The expenditure incurred towards the purchase of FYM was the highest (Rs. 9,450/-) accounting for about 77 per cent of the total material costs followed by fertilizers (9.52 %), seeds (8.44 %) and plant protection chemicals (4.76 %), etc.

d) Among the labour costs, the expenditure incurred towards wages for weedicide application and weeding purpose was the highest (Rs. 4,655) accounting for 38.53 per cent of the total labour costs (Rs. 12,079.75).

e) The average soybean yield of the sample growers was 10.50 quintals per acre and the price realized was Rs. 3,275/- per quintal. The gross returns amounted to Rs. 34,387.50/- per acre and the corresponding net returns was Rs. 2,481/- per acre.

f) In the case of Bidar APMC, the arrivals and prices of soybean registered CAGRs of 44.52 per cent and 5.84 per cent, respectively for the reference period while the corresponding CAGRs were 53.90 per cent and 7.52 per cent, respectively for Humanabad APMC.

g) In the case of Bidar APMC, the soybean arrivals were highest in October and lowest in December while the prices were highest in December and lowest in October. In the case of Humanabad APMC, the soybean arrivals were highest in October and lowest in March while the prices were highest in October and lowest in February.

h) In soybean value chain, the major actors / players involved include producers, wholesalers (soybean and / or value-added products of soybean), processors, retailers (soybean and / or value-added products of soybean) and consumers.

i) There is no efficient value chain for soybean in the study area as there are some missing links between the players / actors within the value chain of soybean which have to be bridged for strengthening the value chain.

j) Majority (67.50 %) of the soybean farmers preferred marketing channel III to sell their produce. Most (55.10 %) of the produce was sold through channel II. The price realised by the farmers was highest (Rs. 3,593/- per quintal) in channel II.

k) Among the value added products of soybean, majority (70 %) of the consumers preferred chunks followed by oil (65 %), sauce (44 %), flour (20 %), etc.

l) Majority (61.54 %) of the consumers preferred Gemini brand of soybean oil followed by Fortune (36.54 %) and Dhara (1.92 %).

m) Majority (60.73 %) of the consumers preferred Nutrela brand of soybean chunks followed by BB Royal (30.35 %).

n) Majority (34.09 %) of the consumers preferred Pantai brand of soybean sauce followed by Healthy Boy (25 %), Premium Dark (13.66 %), Ching's Secrer (11.36 %), etc.

5.3 Study implication

1. The Government may support private companies to establish processing units in the study area so that it enhances the producer's share in the consumer rupee on the one hand and it enables assured supply of the raw materials at reasonable price to the processors on the other.

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