# MANAGEMENT PRACTICES OF FARMERS WITH FOCUS ON VALUE CHAIN: A STUDY OF THE COMBINED STATE OF ANDHRA PRADESH

A thesis submitted to the University of Hyderabad in partial fulfilment for the award of the degree of:

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In

MANAGEMENT

By

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## DECLARATION

I, G. LAKSHMA REDDY, hereby declare that the thesis titled, "Management Practices of Farmers with focus on value chain: A Study of the combined State of Andhra Pradesh" submitted by me under the supervision of Dr. S. Mallikharjuna Rao, is a bonafide research work which is also free from plagiarism. I also declare that, it has not been submitted previously, in part or in full to this university or any other University or Institution for the award of any degree or diploma. I hereby agree that my thesis can be deposited in Shodganga / INFLIBNET.

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(Dr. S. Mallikharjuna Rao)

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Dean

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**THE STUDY: MANAGEMENT PRACTICES OF FARMERS WITH FOCUS ON VALUE CHAIN: A STUDY OF THE COMBINED STATE OF ANDHRA PRADESH**

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## ABBREVIATIONS

| | |
|---|---|
| ANOVA | Analysis of Variance |
| APAU | Andhra Pradesh Agricultural University |
| ATIC | Agricultural Technology Information Centres |
| BAAC | Bank for Agriculture and Agricultural Cooperatives |
| CAGR | Compounded Annual Growth rate |
| CCIS | Comprehensive Crop Insurance Scheme |
| CET | Center of Excellence in Training |
| CKW | Community Knowledge Worker |
| CRIDA | Central Research Institute for Dry Land Agriculture |
| CSO | Central Statistical Office |
| DATT | District Agricultural Advisory and Transfer of Technology |
| DOE | Directorate of Extension |
| EDP | Entrepreneurship Development Programme |
| EEI | Extension Education Institutes |
| FAO | Food and Agriculture Organization |
| FLD | Front Line Demonstrations |
| FSSAI | Food Safety and Standards Authority of India |
| GDP | Gross Domestic Product |
| GOI | Government of India |
| GM | Genetically Modified |
| HRD | Human resource development |
| HYV | High Yielding Varieties |
| IAAP | Intensive Agricultural Area Programme |
| IADP | Intensive Agricultural District Programme |
| IARI | Indian Agricultural Research Institute |
| ICAR | Indian Council of Agricultural research |
| ICRISAT | International Crop Research Institute for Semi-Arid Tropics |
| ICT | Information and Communication technology |
| ISAC | Integrated Scheme of Agricultural Cooperation |
| ISAC&S | Integrated Scheme on Agri-Census & Statistics |
| ISAM | Integrated Scheme of Agricultural marketing |
| JLG | Joint Liability Group |
| KCC | Kisan Credit Card |
| KVK | Krishi Vigyan Kendra |
| MANAGE | National Institute of Agricultural Extension management |
| MIDH | Mission for Integrated Development of Horticulture |
| MSP | Minimum Support Price |
| NABARD | National Bank for Agriculture and Rural Development |
| NATP | National Agricultural Technology Project |
| NBFC | Non-Banking Finance Companies |
| NCIP | National Crop Insurance Programme |
| NGO | Non-Government Organization |
| NFSM | National Food Security Mission |
| NMAET | National Mission for Agricultural Extension and Technology |

| | |
|---|---|
| NMOOP | National Mission for Oilseeds and Oil Palm |
| NMSA | National Mission for Sustainable Agriculture |
| NPK | Nitrogen, Phosphorous, Potash |
| NSSO | National Sample Survey Organization |
| OTS | One Time Settlement |
| RKVY | Rashtriya Krishi Vikas Yojana |
| RRB | Regional Rural Bank |
| SAU | State Agricultural University |
| SDA | State Departments of Agriculture |
| SHG | Self Help group |
| SMFDP | Small and Marginal Farmers Development Programme |
| SPU-KCC | Special Project Unit - Kisan Credit Card |
| T&V | Training and Visit |
| UN | United Nations |
| WTO | World Trade Organization |

# CHAPTER - I
# INTRODUCTION

## 1.0 Introduction

About 68.86% of the 1.21 billion population (Source: Census of India 2011) lives in the villages of India, which also amounts to 11.4% of the world population of 7.3 Billion (Source: United Nations - Department of Economic and Social Affairs, Population Division). In absolute terms 833 million people live in Indian villages. They are primarily dependent on agriculture and or its allied activities. Though agriculture sector contributes to a meagre 18% of the GDP according to Indian Economic Survey by Government of India 2014, it is still the largest provider of employment.

## 1.1 Population of cultivators

Census 2011 says there are 118.9 million cultivators across the country or 24.6% of the total workforce of over 481 million. The number and percentage of cultivators, according to Census, since 1951 to 2011 are given in table 1.1.

Table 1.1

| Sl. No | Year | No. of Cultivators In Millions | Percentage of cultivators In the total work force in India |
|---|---|---|---|
| 1 | 1951 | 69.9 | 49.9 |
| 2 | 1961 | 99.6 | 52.8 |
| 3 | 1981 | 92.5 | 37.8 |
| 4 | 1991 | 110.7 | 35.2 |
| 5 | 2001 | 127.6 | 31.7 |
| 6 | 2011 | 118.6 | 24.6 |

(Source: Census 2011)

## 1.2 Farmer

Definition of a Farmer: “A farmer is one who owns or manages a farm” as per Oxford Dictionary. The farmer cultivates crops or raises animals (as livestock or fish). This study deals with those farmers cultivating crops of different varieties like food grains, commercial crops and horticultural crops either owning the land or taking the land on tenancy.

Currently India is the second largest populated country in the world with 1.21 billion (Census 2011). United Nations forecast that India will cross 1.5 billion mark by 2035 and becomes the world`s largest populated country.

It is the farmer who cultivates and feeds such gigantic and fast increasing population, which makes him/her the most important person, on whom the whole nation as a whole depends for its food and non-food crop requirements.

## 1.3 Farming activities

There are various activities that the farmer takes up on his farm for raising crops. They start from preparing the land with tilling to irrigating, sowing, fertilization, weeding, protecting from pests, inter-cultivation, harvesting, transporting the produce, selling etc. He uses finance or credit from financial institutions, power and irrigation, market yards, ware houses, rural roads and extension service provided by the Government as supporting activities. He uses inputs like seeds, fertilizers, pesticides, weedicides, labour, mechanization and technology, insurance made available to him by various agencies.

### 1.3.1 Tilling

Tilling is an activity of preparing the land for sowing. He tills/ ploughs it using bullocks and plough or tractor at an appropriate time after the initial monsoon rains.

### 1.3.2 Irrigating

Based on the specific requirement of the crop that he intends to raise, he will supply the adequate amount of water to the land using any or a combination of

various sources available to him like canal, tank, bore/ tube well. Food grain crop like paddy needs a lot water to fill the land, while commercial crops like cotton, tobacco, chillies etc. need less amount of water than paddy. But the important factor in irrigation is not only the amount of water, but also the timely supply of water whenever the crop needs intermittently.

### 1.3.3 Sowing

The farmer either sows the seed directly in the land or raises the nursery separately and transplants it. He uses either manual labour for sowing or machinery for sowing/ transplanting.

### 1.3.4 Fertilisation

Based on the specific requirement of each crop raised, the farmer applies ones fertilizers to the land at different points in time during the duration of the crop. These fertilizers he purchases either from the government agencies or private agencies either on cash or on credit.

### 1.3.5 Weeding

Sometimes there may be weeds (which snatch away the fertility from the crop raised) coming up, which need to be removed. The farmer either removes the weeds either manually or uses chemical weedicides to destroy them.

### 1.3.6 Plant Protection

There may be proliferation of various kinds of pests and or diseases which destroy the crop raised at different points in time during the duration of the crop attacking any or more parts of the body of the crop. The farmer uses plant protection equipment like sprayers and chemicals (pesticides) to protect the crop from the pests/ diseases.

### 1.3.7 Inter cultivation

There are certain inter cultivation activities that the farmer needs to take up to assist / enhance the growth of the crop during the duration of the crop.

### 1.3.8 Harvesting

Once the crop reaches its final stage when it is ready for harvesting, the farmer harvests the crop either manually or by using machinery.

### 1.3.9 Packing, Transporting

The output produce is packed if needed and transported from the field either to his home or ware house or to the market for selling.

### 1.3.10 Selling

The farmer sells his produce at his village/ farm or market yard either to the middlemen or private companies or governmental agencies at a time he thinks is right for getting the best price possible. He then collects the sale proceeds, redeems his debts if any and uses the profit if any for his family expenses.

### 1.3.11 Farm credit/ crop loan

The farmers takes farm credit or crop loan if needs either from cooperative credit societies or cooperative banks or commercial banks or private money lenders to meet the expenses during cultivation to repay after the produce is harvested.

### 1.3.12 Power

Farmer needs power to irrigate his land or to take up other mechanized activities, which is provided by the government. The farmer depends on governmental support for this part of basic infrastructure.

### 1.3.13 Irrigation

The water is provided by the government through canals or he himself digs bore wells for picking up ground water. He may even use the tank water if available. For this part of infrastructure also he depends on government.

### 1.3.14 Market yards

The government establishes certain markets yards in different areas which are basically platforms from which the farmer can sell his produce to the buyers, with an intention to help the farmer fetch the maximum price possible. Some markets yards may be general dealing with all varieties of crop produce or specific to deal with specific crop produce.

### 1.3.15 Ware houses

Ware houses are storage spaces created by either the government or private agencies, which are called private ware houses or public ware houses. They may be general in nature or cold storages to store certain crop produces. This is another part of infrastructure made available to the farmer which he may use or not.

### 1.3.16 Rural-road connectivity

The government provides the rural roads as part of its planned expenditure to help farmers transport his inputs from the market to the farm or produce from the farm to the markets. More the rural road connectivity, the better the convenience and lower the cost to the farmer in transportation.

### 1.3.17 Extension

Agricultural extension is an activity through which technology, knowledge and skills are transferred to the farmer. There is an agricultural department in the government with agricultural specialists or there are research organizations (private or public) and agricultural universities which constantly provide the

extension services to improve the knowledge and skills of the farmers for his betterment.

### 1.3.18 Inputs

Farmer needs various inputs like seeds, fertilizers, pesticides and weedicides etc. for raising the crop which are provided by either governmental agencies or private agencies. They may of good quality or poor quality based on the integrity of the agency which provides them.

### 1.3.19 Labour

The farmer hires the labour for doing various farming activities. The availability and costs of labour are important for the profitability.

### 1.3.20 Mechanization

There are various kinds of machines use in the faring activities developed by either governmental agencies or private organizations. The farmer may use them depending on the convenience or cost consideration.

### 1.3.21 Technology

Various kinds of technological developments are taking place for use in agriculture which are being developed both by the governmental agencies, agricultural universities and research organizations and private/ corporate enterprises. The farmers us them in their agricultural activities based on adaptability and availability and affordability. All these agricultural activities can be studied from the perspective of the well propounded “Value Chain” concept of Michael Porter.

## 1.4 Value chain by Michael Porter

To analyse the specific activities through which firms can create a competitive advantage, is useful to model the firm as a value chain of value creating activities. Michael Porter identified a set of interrelated generic activities common to a wide

range of firms. The resulting model is known as the value chain and is depicted below.

### 1.4.1 Primary Activities

Inbound logistics → Operations → Outbound logistics → Marketing & sales → Service

The goal of these activities is to create value that exceeds the cost of providing the product or service, thus generating a profit margin.

- Inbound logistics include the receiving, warehousing, and inventory control of input materials.
- Operations are the value –creating activities that transform the inputs into final product
- Outbound logistics are the activities required to get the finished product to the customer, including warehousing, order fulfilment etc.
- Marketing & sales are those activities associated with getting the buyers to purchase the product, including channel selection, advertising, pricing etc.
- Service activities are those that maintain and enhance the product` value including customer support, repair services etc.

Any or all of these primary activities may be vital in developing a competitive advantage. These five categories are generic and portrayed here in a general manner. Each generic activity includes specific activities that vary by industry.

### 1.4.2 Support activities

The primary value chain activities described above are facilitated by support activities. Porter identified four generic categories of support activities, the details of which are industry specific.

- Procurement: The function of purchasing the raw materials and other inputs used in the value-creating activities.
- Technology development: includes research and development, process automation, and other technology development used to support the value chain activities

- Human resource management: the activities associated with recruiting, development, and compensation of employees.
- Firm infrastructure: includes activities such as finance, legal, quality management etc.

Michael Porter emphasizes that the categories of both primary value chain activities and support value chain activities are very general in nature and need to be looked at from the perspective of the industry in question. Any or more of the value chain activities can be used to study the specific industry. This research studies the value chain concept from perspective and relevance to agriculture.

## 1.5 Relevance of Porter's "value chain" in agriculture

If one considers farmer as a firm theoretically, he needs to manage the value chain described above exactly like a firm. He needs to get efficient with inbound logistics, operations, outbound logistics, and marketing and sales to maximize his profit. Service is some activity that may not be applicable in case of the farmer. When it comes to support activities there are some activities for which he depends on either the government or private enterprises for aspects like technology, mechanization, power, irrigation, market yards, ware houses, finance, insurance etc. "The primary objective is to maximize the value (not the cost) of each aspect of the value chain such that, that the created value is higher than the cost of the product or service that goes into it" says Michael Porter. Therefore study of management practices of farmers with special focus on value chain assumes greater relevance.

## 1.6 Significance of the study

Agriculture is the back bone of India. There is a macro level need for food and non-food crops which is very high for the fast growing population of India, which is likely to cross about 1.5 billion by 2035 as per the forecast by United Nations. There are national food security concerns and hence agriculture is very significant at national level. Over 70% of the people (as per Census 2011) are living in rural India whose primary activity is agriculture. In the entire value chain of agriculture

farmer occupies the prime position. Farmer is managing his agricultural value chain and also using the supports from other agencies to maximize the value. Hence the study of the management practices of the farmer with focus on value chain assumes greater significance.

## 1.7 Scope of the study

The scope of the study includes various management practices of the value chain beginning with soil testing to finally the sale of the produce and receiving sales proceeds.

It includes geographical coverage in three regions viz: Telangana, Rayalaseema and Coastal Andhra Pradesh (in the state of Combined Andhra Pradesh). The state of combined Andhra Pradesh was bifurcated as Telangana and Residual Andhra Pradesh only in June 2014. This study was done with the data available prior to June 2014 and no authentic published data was available thereafter. Hence the term combined Andhra Pradesh.

It also includes various supports that the farmer gets from the agricultural sector as a whole. The scope of the support the farmer gets is studied only from the farmer perspective.

## 1.8 Research Design

### 1.8.1 Research Gap

From the review of literature it is understood that though some research was done on some variables of agriculture in certain aspects of value chain, there is no research done in a comprehensive way covering the management value chain perspective. There was some research that was done on management of value chain in agriculture in some other countries like Srilanka, Bangladesh, Zimbabwe, Kenya, Netherlands etc. The studies that were done in India on some variables were based on secondary data. Though few case studies were commissioned at national level, the research does not show that the benefits of macro level policies reached the farmer level. Therefore the research gap thus identified is being addressed in this study.

### 1.8.2 Research Questions

The study has chosen to use some hypotheses. To formulate the hypotheses (to be tested) certain research questions were raised. These questions have been raised after making a review of literature on management of agriculture. The research questions are:

1. What is the growth of Indian agriculture in the last fifty years?
2. What are the important factors of management of value chain in agriculture?
3. What is the relative importance of each factor ranking wise, among them, in the value chain?
4. Are the demographic factors viz. education and number of years of experience influencing the adoption of new technology in the value chain?
5. What are the management practices of farmers at farmer level?
6. Are there differences of management practices among the three regions in the united state of Andhra Pradesh?
7. Is there a relationship between the management practices and yield?
8. Is the government policy of MSP adequately supporting the management of agriculture?

### 1.8.3 Research Objectives

Broadly the research objective of the study is to analyse the management practices of farmers with special focus on value chain, the specific objectives are:

1. To identify the important factors influencing the management of value chain.
2. To examine the relative importance of each of the factors in the value chain.
3. To study the influence of the demographic factors on adoption of new technology in value chain.
4. To study the differences among the three regions in the state of united Andhra Pradesh with respect to management of value chain.
5. To study the relationship between the four important factors of management (Viz.: Technology, Production, Infrastructure and Marketing) and the yield.

6. To study the government policy-MSP (Minimum Support Price) adequately supporting the management of value chain.

### 1.8.4 Hypotheses

H1: There is a significant difference among the farmers in the three regions (Telangana, Rayalaseema and Coastal Andhra Pradesh) in managing the value chain.

H2: There is a significant difference among the farmers growing food grains, commercial crops and horticultural crops in managing the value chain.

H3: There is a significant difference among marginal, small, semi-medium, medium and large farmers in managing the value chain.

H4: The factors of management have significant influence on the yield.

H5: Demographic factors viz. education and number of years of experience influence adoption of new technology management.

H6: Government policy-MSP (Minimum Support Policy) adequately helps in getting better price for the produce.

### 1.8.5 Research Methodology

The study is "descriptive" in nature regarding the management practices of value chain of the farmers. It includes survey and fact finding enquiries of the management practices. The major purpose of the descriptive research is the description of the state of affairs as it exists at present. The descriptive methodology not only focuses on the management practices of value chain that the farmer manages, some of which are under his control and the others for which he takes the support of the infrastructure, products and services provided both by government and private enterprises. The study will draw findings and conclusions and attempt to make suggestions if any, to maximize the financial benefits to the farmers.

### 1.8.6 Target Population

All the farmers in the three regions viz. Telangana, Rayalaseema, and Coastal Andhra in the combined state of Andhra Pradesh are the target population. The target population includes farmers who grow food grain, commercial and horticultural crops. It also includes wet land and dry land farmers. It further includes owner and tenancy farmers. The target population also includes marginal, small, semi-medium, medium and large farmers.

### 1.8.7 Sampling Technique

The sampling technique used is purposive sampling. The purposive sampling technique is used with a purpose to include farmers growing diversified crops like food grains, commercial crops and horticultural crops. Owner farmers and tenancy farmers, wet land farmers and dry land farmers, farmers holding different sizes of land holding are also included so as to have representation from all the categories of the farmers and the study is comprehensive. With respect to the farmers by land holding size, the sample selected is as per the proportion defined by the department of agriculture and cooperation and the total population data presented by them. The total population and the sample selected are given below.

Table 1.2 (Land Holding size and classification of farmers)

| Category of farmers | Land holding size in hectares[1] | Total Population % | Sample population % |
|---|---|---|---|
| Marginal and small | Less than 2 | 85 | 85 |
| Semi medium | 2 - 4 | 10 | 10 |
| Medium | 4 - 10 | 4.2 | 4 |
| large | Above 10 | 0.7 | 2 |
| Total | | 100 | 100 |

1 Category as defined by department of agriculture and cooperation.

Karimnagar district was selected in Telangana region. Kurnool district was selected in Rayalaseema region and Guntur district was selected in Coastal

Andhra region. These districts were selected mainly for the similarities in agriculture.

The total cropped area in Guntur district is 863,000 hectares, in Kurnool district it is 1,002,000 hectares and in Karimnagar district is 651,000 hectares. The net sown area is 635,000 hectares, 910,000 hectares and 571,000 hectares in Guntur, Kurnool and Karimnagar districts respectively.

Total gross area irrigated in Guntur district is 571,000 hectares, in Kurnool district 277,000 hectares and in Karimnagar district it is 663,000 hectares. The net irrigated area in Guntur district is 438,000 hectares, in Kurnool district it is 231,000 hectares and in Karimnagar district it is 556,000 hectares.

The food crops are grown in 621,000 hectares in Guntur district, 569,000 hectares in Kurnool district and 610,000 hectares in Karimnagar district. The non-food crops are grown in 242,000 hectares in Guntur district, 433,000 hectares in Kurnool district and 262,000 hectares in Karimnagar district. Diverse crops are grown in these three districts like Paddy, Sugarcane, Cotton, Tobacco, Turmeric, Chillies, Ground nut, fruits and vegetables. It is for the diversity of crops and the similarities of agriculture, these districts were selected.

Source: Source of the above secondary data is the Directorate of Economics and Statistics, Andhra Pradesh and Telangana in their Agricultural Statistics at a glance 2014. All the data above is for the year 2013-14.

### 1.8.8 Sample Size

An attempt to collect primary data from about 900 farmers from all the three regions (about 300 from each) in the combined state of Andhra Pradesh was made. Some farmers have not responded. Totally 676 respondents responded from the three regions in the combined state of Andhra Pradesh and the data thus collected and tabulated was analysed.

### 1.8.9 Sampling and Data Collection Methods

The study has chosen purposive sampling to collect primary data from the target farmers. After identifying the targeted population study carefully planned the data

collection. Questionnaire survey is the main way of collecting the data from the farmers. Since the farmers may or not may not be educated to answer the questions on their own, the administered questionnaire was the route taken up to elicit the responses. The questionnaire was prepared in English. Since many of the farmers may not know English, the questions were translated into Telugu language, which is their mother tongue. That would make the farmer understand the question well and would be able to answer to the best of his knowledge and experience.

A pilot study was conducted and responses collected from 50 farmers to check whether the questionnaire was properly designed to elicit the responses with the conceptual framework in mind. After analysing the data collected from the pilot study, the necessary changes were made in the questionnaire and then the final survey was conducted. The answers collected through the administered questionnaire were tabulated; the data was entered in the SPSS tool for further analysis.

### 1.8.10 Reliability

In reliability analysis (Bohrnstedt 1977, Norusis 1997: ch.6, 13) the items/ questions were used to determine the extent to which they were related to each other. This is to get the overall index of the internal consistency of the scale as a whole, and to exclude the items for exclusion. The Cronbach Alpha was arrived at from the items and found that it is given in table 1.3.

Table 1.3

| **Reliability Statistics of the study Cronbach Alpha value** | |
|---|---|
| Cronbach Alpha | No. of Items |
| 0.723 | 32 |

The Cronbach value is 0.723. The value of 0.723 is acceptable. The items in question are interrelated and the there is good consistency of the items.

## 1.9 Data Analysis

The primary data collected has been first sorted out and verified through the process of completed questionnaires. Then the descriptive and inferential statistics have been used to analyse the data and to draw the valuable inferences from that analysis. For this purpose, SPSS 20.0 statistical software was used. It is an advance statistical software package to analyse the data. It enables us to do the required statistical analysis within a short period of time without any calculation errors.

Various statistical techniques have been used. The appropriate non parametric tests were used wherever applicable.

### 1.9.1 Reliability of the Instrument - Cronbach Alpha

For drawing inferences from the analyses, it requires the primary information from the farmers of different categories-regions, crops, types cultivation etc. To get the primary information a research (instrument) questionnaire has been designed and executed. Here the reliability of the instrument is tested at two points of time.

- After the completion of the pilot test, the reliability was tested.
- After completion of the final survey, the reliability was tested.

An alpha score of 0.7 to 0.8 is normally acceptable value for Cronbach alpha. Values which are substantially lower indicate an unreliable scale. Nunnally (1978) says that even if Cronbach value is 0.6, one can accept it. Cortina (1993) notes that such general guidelines need to be used with caution, because the value alpha depends on number of items on the scale.

### 1.9.2 Factor Analysis:

When the variables are very many it is very difficult to analyse and come to some conclusion. In such a scenario, the variables are put through Factor analysis, which actually reduces the variables into limited number of components which can be easily analysed. This is also called reduction method. From the questionnaire, 32 variables were taken and factor analysis was done to reduce

them to limited number of factors, so that meaningful analysis and statistical tests could be done to draw proper conclusions.

When the factor analysis is done, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy is measured. If the KMO value is more than 0.60, then it means that the samples surveyed are adequate statistically.

Table 1.4 (Factor analysis KMO and Bartlett`s test)

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling adequacy. | | .814 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 7847.663 |
| | df | 496 |
| | Sig. | .000 |

In the factor analysis done in this study, the KMO value came to 0.814, which means the number of samples used is very much adequate. Next it is tested for Bartlett`s Test of Sphericity. When the test is done, if the significance is less than 0.05, it means that the factor analysis is a good fit in the analysis. In our study the significance is 0.000, which means the factor analysis is a good fit. The same are given in table 1.4. 32 Variables were included in the communalities and the factor analysis was done by the Principal Component Extraction Method. The analysis has extracted four components which explained the maximum amount of variance. These four components were used for further statistical tests.

### 1.9.3 ANOVA Test

The significance of difference, between the means of two samples can be judged through Z-Test or T-Test. But to examine the significance of the difference amongst more than two sample means at the same time, ANOVA (Analysis Of Variance) is used. ANOVA is essentially a procedure for testing the difference among different groups of data for homogeneity. The essence of ANOVA is that the total amount of variation in a set of data is broken down into two types, that amount which can be attributed to chance and that amount which can be attributed to specified causes. Two estimates of population variance viz.,one

based on between samples variance and the other based on within the samples variance. The said two estimates of population variance are compared with F-test, where in we work out F value.

F = (Estimate of population variance based on between the samples variance) ÷ (Estimate of population variance based on within the samples variance)

This value of F is to be compared to the F-Limit for given degrees of freedom. If the F value calculated is equal or exceeds the F-limit value to be seen from F Tables, then we may say that there are significant differences between the sample means.

Population Samples

There are different sets of population samples data in this research.

1. The data is collected from three population samples region wise - Telangana, Rayalaseema and Coastal Andhra Pradesh.
2. The data is collected from three population samples crop wise - farmers growing Food grains, farmers growing Commercial crops and farmers growing horticultural crops.
3. The data is collected from five population samples of farmers based on land holding size - marginal, small, semi medium, medium and large.

To test whether there are significant differences among each set of sample, ANOVA tests were done.

### 1.9.4 Chi-Square Test

Chi-Square is a statistical measure used in the context of sampling analysis for comparing a variance to a theoretical variance. As a non-parametric test, it "can be used to determine if categorical data shows the dependency or the two classifications are independent. It can also be used to make comparisons between theoretical populations and actual data when categories are used." The chi square test is in fact a technique through use of which it is possible to i) test the goodness of fit ii) test the significance of association between two attributes iii) test the homogeneity or the significance of population variance.

As a test of independence chi square test enables to explain whether or not two attributes are associated. The Pearson chi square statistic is a test to see whether the two variables are independent or not. If the significance value is small enough conventionally sig. must be less than 0.05, then reject the null hypothesis. Thus variables are independent and gain confidence in the hypothesis that they are some way related. The P-Value is the probability of observing a sample statistic as extreme as the test statistic.

### 1.9.5 Regression Analysis

In multiple regression, a linear composite of explanatory variables is formed in such a way that it has maximum correlation with a criterion variable. This technique is appropriate when the researcher has a single metric criterion variable which is supposed to be a function of other explanatory variables. The main objective in using this regression technique is to predict the variability of the dependent variable based on its covariance with all the independent variable. One can predict the level of the phenomenon through multiple regression analysis model, given the levels of independent variables.

A regression analysis using the phenomenon variables and the criterion variable is done and the correlation coefficient and the regression value is arrived at to check the predictability.

## 1.10 Chapterisation of the Dissertation

*Chapter 1 Introduction of agriculture and management of value chain*

This chapter begins with the world population and the growing Indian population. It highlights the large population of cultivators in the villages in India and their role in Indian agriculture. It defines the “farmer”. The farming activities are enlisted in detail. The concept of “value chain” propounded by Michael Porter and its relevance in agriculture was brought out. The chapter clearly states the significance of the study and the scope of the study. The chapter then goes on to explain the research design in terms of research gap observed from the review of

literature, raising valid research questions in the study. Then the precise and brief research objectives were stated. It enlisted the formulated Hypotheses. The research methodology followed is explained in detail. Then the chapter goes on to mention the target population. It sufficiently explains the rationale behind the sampling technique and sample size arrived at. It explains the method of data collection and data analysis and the statistical tools used for testing the hypotheses.

*Chapter 2 Review of earlier research*

This chapter details the literature reviewed in all the farming activities of agriculture. The literature review covered areas such as agricultural marketing, agricultural technology development and transfer, agricultural inputs, finance and credit, fertilization, agricultural insurance, agricultural extension, knowledge and training, agricultural exports, agri-processing units, agricultural infrastructure. The literature was sourced from various research publications, books and also web sites. The planning commission reports of the working groups were gone through. From the extensive review of the literature, the pertinent variables were culled out and the research gap found out.

*Chapter 3 Growth of Indian Agriculture in the last fifty years*

This chapter has detailed coverage of the growing Indian agriculture history for the past fifty years from the perspective of the culled out variables from the review of literature. It covers the changes in the variables from growth perspective both at macro India level and also at the level of the united Andhra Pradesh State, the state of the study. It covered various crops and their productions over a period of time with growth statistics. It dealt in detail the green revolution and the benefits India got from it. It also enlisted the government policies which directed the agricultural growth India. It also covers the role of private enterprises in the growth path. It talks about the new trends in GM Crops and the suspense on their proliferation. This chapter also had listed out the comparison of crops and yields with other countries in the world.

*Chapter 4 Data Analysis of the study*

This chapter details the primary data collected from the farmers on the management practices of farmers with special focus on the value chain. It explains how the data is tabulated and which soft wares were used for the analysis. It deals with the demographic profiles of the respondents in percentages. It deals with the selection of the appropriate tests and why they selected to test the hypotheses. It explains as to what is the test and the concept behind it. It brings out the resulting out puts of the tests and the interpretations for all the tests conducted.

*Chapter 5 Findings, conclusions and suggestions of the study*

This chapter enlists the findings of the analyses with interpretations in detail. It also draws conclusions based on the findings consistent with the objectives listed earlier. It looks at the coherence in the entire research proceeding. The chapter comes up with suggestions as well.

## 1.11 Limitations of the study

Due to paucity of resources, the study covered only one state and that is the combined Andhra Pradesh state, and hence may not represent all India if survey attempted. The scope of the study is wide and therefore only important factors of the management of value chain in agriculture are covered in the study and to that extent it is limited. Since the technology is fast changing there may be new management practices or new way of managing the value chain may take place which may be limitation. The ever changing government policies are also a limitation for the study.

## 1.12 Directions for Future Research

The present study covers various management practices of farmers with special focus on value chain in the three regions viz.: Telangana, Rayalaseema and Coastal Andhra Pradesh in the combined state of Andhra Pradesh. It focused on

important factors of management viz.: Technology, Production, Infrastructure and marketing. Further research can be done on other factors of management in the value chain which are not covered in this study. Further research can be done in depth in each of the factor of the value chain at all India level. As the policies of the government would have impact on the management of value chain at farmer level, and that the policies are announced from time to time, further research can be done incorporating them as well from time to time.

## 1.13 Summary of chapter I

830 million people live in Indian villages and primarily dependent on agriculture and allied activities. There are about 118 million cultivators in India and form about a quarter of the total workforce in the country. The "farmer" in this study cultivates various crops and while cultivating, takes up various activities from tilling the land to selling the final produce. These activities are similar to the activities of the value chain conceptualized by Michael Porter. This introductory chapter looked at each activity of the farmer as a value chain and attempted to see as to how he is managing it. The study of the value chain is significant from the point of the farmer, since it is his livelihood. The scope of the study included the various management practices of the farmers and three regions in the combined state of Andhra Pradesh. The research gap found out is the management of value chain by farmers in a comprehensive manner at farmer level and at sector level. Pertinent research questions emerged which were converted into brief and precise objectives. From the research objectives, the hypotheses were formulated. The research methodology was descriptive and targeted all the farmers in the three regions (Telangana, Rayalaseema and Coastal Andhra) in the combined state of Andhra Pradesh. The sampling technique used is purposive and 900 sample size was aimed at and finally 676 was achieved. The primary data collected from the respondents was tabulated, and analysed using percentage analysis. The hypotheses were tested using appropriate statistical tools like Cronbach Alpha, Factor Analysis, ANOVA Tests, Chi Square Tests and Regression Analysis. The results of the tests were interpreted, findings observed and conclusions drawn.

The chapterisation was planned. The limitation of the study was the paucity of resources to conduct across the country. The directions for the future research were mentioned.

# CHAPTER - II
# REVIEW OF LITERATURE

## 2.0 Introduction

Agriculture sector contributes 13.9% of the Gross Domestic Product (GDP) according to the economic survey of the Government of India 2014. Though agriculture contributes only 13.9% of GDP, it provides the largest employment opportunity to the people living in villages of India according to the Census 2011. As per Census 2011 there are 118 million cultivators in India engaged in the farming activities. Oxford dictionary defines farmer "as one who owns or manages a farm". The farmer may be engaged in crop cultivation or live stock or fishery cultivation. This study is confined to the farmers engaged only raising crops. The activities of the farmer and how he takes the support from other public or private agencies form a value chain.

## 2.1 Value Chain

Michael E Porter(1985) first introduced the concept of "Value Chain " in his book " The Competitive Advantage" in 1985. He primarily developed the concept of value chain of a firm`s tasks to compete better in a competitive environment. He classified the activities of the firm in his book as "Primary Activities" and "Support Activities". The primary activities include inbound logistics, operations, outbound logistics, marketing and sales and service. The primary value chain activities are facilitated by support activities. The support activities that Porter identified are procurement, technology development, human resource management and firm infrastructure. He says "the goal of these activities is to create value that exceeds the cost of providing the product or service". He also said that these categories of value chain - primary or support are very

general in nature and can be adapted to any industry depending on its environment and conditions existing.

### 2.1.1 Value Chain concept in agriculture

From around the beginning of the millennium, the agricultural value chain concept is being used primarily by the personnel associated with agriculture in developing countries. There is no clear definition for the agricultural value chain, but it covers the whole range of activities that are taken up in agriculture.

Kaplinsky.R and Morris.M (2003) in a publication of " A Hand Book for Value Chain Analysis" adopted the term "Agricultural Value Chain" for explaining the agricultural development.

Henriksen.L, L. et. al (2010) in their working paper " Agro-Food Value Chain Interventions in Asia : A review and analysis of case studies , said "At the heart of the agricultural value chain concept is the idea of actors connected along a chain producing and delivering goods to consumers through a sequence of activities". They further said " However, this "vertical" chain cannot function in isolation and important aspect of the value chain approach is that it also considers "horizontal " impacts on the chain, such as input and finance provision, extension support and the general enabling environment".

In the Editorial "Adding Value" by Michael Hailu (2012) in "Spore No. 157" , says " the approach has been found useful, particularly by donors, in that it has resulted in a consideration of all those factors impacting on the ability of the farmers to access markets profitably, leading to a broader range of chain interventions . It is used both for upgrading existing chains and for donors to identify market opportunities for small farmers".

The concept of "Value Chain" was used by Webber .C. M. And P. Labaste(2010) in their article for World Bank "Building competitiveness in Africa`s agriculture: a guide to value chain concepts and applications"

According to Webber C.M. and P. Labaste, the term "Value Chain" is now being used to refer to a range of types of value chain including:

i) An international or regional commodity market. Examples could include "the global cotton value chain", "the southern African maize Value chain or "the Brazilian coffee value chain"
ii) A national or local commodity market or marketing system such as "the Ghanaian tomato value chain" or "the African tomato value chain"
iii) An extended supply chain or marketing channel, which embraces all activities needed to produce the product, including information extension, planning, input supply and finance. It is probably the most common usage of the value chain term.
iv) A dedicated chain designed to meet the needs of one or a limited number of buyers. This usage , which is arguably most faithful to Porter`s concept stresses that a value chain is designed to capture the value for all actors by carrying out activities to meet the demand of consumers or of a particular retailer , processor or food service company supplying those consumers . Emphasis is firmly placed on demand as the source of the value.

According to Shepherd Andrew (2006) linking producers to the companies as a subset of value chain was emphasized.

Integrated Value Chains have importance in "Contract Farming" that do not involve small holders. For example Unilever operates tea estates and tea processing facilities in Kenya and then blends and packs the tea in Europe before selling under the brand names "Lipton, Brooke Bond, or PG

Tips". The bulk of the agricultural value chain in contract farming revolves around companies and large independent farmers.

Haggablade et. al (2012) Talked about "inclusive value chains where in small scale farmers can be incorporated into existing or new value chains and extract greater value from the chain by increasing efficiency or by also carrying out activities along the chain."

Agricultural value chain finance is about the flow of funds to fund within a value chain to meet the needs of chain actors for finance, to secure sales, to buy inputs or produce, or to improve efficiency. For example inputs can be provided to the farmers by the company and can be settled when the produce is delivered, which is normal in contract farming as per Food and Agriculture Organization (FAO).

Information and Communication Technologies (ICT) became an important tool in promoting agricultural value chain efficiency. Through ICT farmers can get SMS messages directly on their mobile phones. ICT is also being used to strengthen the capacity of the extension officers and NGO field staff to reach farmers with timely and accurate information and at the same time captures the data from the field. The Grameen Foundation`s Community Knowledge Worker (CKW) programme is an example.

Farmer cultivates his land and produces the crop by taking up various activities which can be called value chain. Some of the primary activities that he performs on his farm are in his control and for others he takes the support from outside agencies. It is worth studying the management practices of farmers with focus on value chain, since he is the prime position in the entire value chain in agriculture.

## 2.2 Indian Agriculture:

830 million people live in rural India whose primary occupation is agriculture and allied activities. The needs of the 1.21 billion population of India as per Census 201154 for food and non-food agricultural produce are being met by the farmers and agricultural labourers who are engaged in cultivation. Agriculture is vulnerable to the timely and adequate rain fall and is going through the vagaries of monsoon. The growth rate of Indian agriculture fluctuates subject to the rainfall. In the face of the impeding deficit rain fall in this year 2014-15, the Ministry of Agriculture in the Government of India faces an immediate challenge to sustain the agricultural output of the country. The Ministry prepared all the requisite measures in co-ordination with the State Governments to have the District wise contingency action plans in place and to bring in flexibility in the various schemes in order that the States are enabled to cope with any desired changes in the approved action plans for tackling the situation arising out of deficit rainfall. With this perspective, the Central Research Institute for Dry Land Agriculture (CRIDA) in collaboration with the State Agricultural Universities (SAU) and the State Governments has prepared crop contingency plans in respect of 576 districts across the country. Further, all necessary and appropriate steps have been taken to meet the seed and fertilizer requirement and to disseminate information and on suitable farming practices to be followed in such a situation. Indian agriculture at a glance:

- Agriculture continues to be a very important sector in Indian economy since it needs to meet the food and non-food requirement of 1.21 billion people. And the population is growing fast. As per the estimates of the population division of United Nations (UN), Indian population is likely to cross 1.5 billion mark and may make it the world`s largest populated country. From this perspective, Indian agriculture assumes greater significance and needs all the attention it deserves.

- The total share of Agriculture and Allied sectors (including Agriculture, Livestock, and Forestry and Fishery sub sectors) in terms of percentage of Gross Domestic Product (GDP) is 13.9% during 2013-14 at 2004-05 prices. (As per the estimates released by the Central Statistical Office, CSO).
- Indian Agricultural Sector employs 54.6% of the total work force as per Census 2011.
- For the 12th Five Year Plan (2012-17), Government of India has set an ambitious target of 4% for the Agriculture Sector.
- As per the 4th Advance Estimates of Production of Food Grains for 2013-14 the total Food Grain production is estimated to be 264.77 million Tonnes.

## 2.3 Growth Strategy

In order to keep up the momentum gained during the 11th Plan and achieve the targeted growth rate of 4% during the 12th Five Year Plan and also ensure focused approach and to avoid overlap, all the on-going 51 schemes of the Department have been restructured into five missions viz. National Food Security Mission (NFSM), Mission for Integrated Development of Horticulture (MIDH), National Mission on Oil Seed and Oil Palm (NMOOP), National Mission for Sustainable Agriculture (NMSA), and National Mission on Agricultural Extension & Technology (NMAET); five Central Sector Schemes viz. National Crop Insurance Programme (NCIP), Integrated Scheme on Agri-Census & Statistics (ISAC&S), Integrated Scheme of Agriculture Marketing (ISAM), Integrated Scheme of Agriculture Cooperation (ISAC) and Secretariat Economic Service; and one State Plan Scheme viz. Rashtriya Krishi Vikas Yojana (RKVY).

Recognizing the importance of Agriculture Sector, the Government during the budget 2014-15 took a number of steps for sustainable development of

Agriculture. These steps include enhanced institutional credit to farmers, promotion of scientific warehousing infrastructure including cold storages and cold chains in the country for increasing shelf life of agricultural produce, Improved access to irrigation through Pradhan Mantri Krishi Sichayee Yojana, provision of Price Stabilisation Fund to mitigate price volatility in agricultural produce, Mission mode scheme for Soil Health Card, Setting up of Agri-tech Infrastructure fund for making farming competitive and profitable, provide institutional finance to joint farming groups of "Bhoomi-Heen Kisan" through NABARD55, development of indigenous cattle breeds and promoting inland fisheries and other non-farm activities to supplement the income of farmers, according to GOI.

## 2.4 Agricultural Inputs

Seeds, Fertilizers and Pesticides are the three important agricultural inputs that are required for agriculture in time, in adequate quantity and with good quality. All three aspects of timeliness, adequacy and quality are essential to maximise the yields and there by the incomes of the farmers. Timing is very important because the farmer needs to sow the seed and apply fertilizers in his farm at right time on the onset of monsoon after he prepares the seed bed and after planting. He needs to procure the seeds and fertilizers in sufficient quantity and quality to achieve better yields. The farmer needs to protect his crop from the pest infestation and uses pesticides, which are need to be procured and spray at appropriate timing. The quality is of utmost important. Many researchers have contributed to the research on agricultural inputs. Some dealt with the demand and supply of these inputs, some others about the delivery systems of the inputs. Some researchers dealt with the constraints and challenges by the farmers in procuring the inputs.

Shoji Lal Bairwa et. al (1996) in his study suggested intervention strategies and recommendations that can assist in developing the efficient inputs and

service delivery system for better growth in farm income level of all classes of farmers. The general objective of the study is to evaluate the agricultural inputs and service delivery systems in the country and to assess the structure of the existing agricultural inputs and service system in case of marketing channels. Later, the study also highlights the constraints/challenges faced by farmers as well as input dealers in the farm inputs and service sector. However, the study was based on secondary data.

Venkatesh et al. (2014) in his study examined the major institutional changes in agricultural input markets and use of inputs across the farming community of the country in the previous decade. More specifically, it discusses the three aspects of inputs:

(i) Trends in major agricultural inputs use
(ii) Their accessibility to small farmers
(iii) Institutional changes in the delivery of input and services.

The study has sourced the data from various government reports mainly from National Sample Survey Organization (NSSO) input survey. Some important findings of the study are: “the input-use has expanded to a large extent in the previous decade, especially in the second half of the 2000s. The input-use and farm-size have indicated a mixed relationship. Interestingly, the chemical fertilizers and pesticide use has shown an inverse relationship that is as farm-size increases input use declines, whereas, in case of institutional credit it is just the opposite. The number of farm households using power-operated implements has increased in large numbers and the use of hand and animal operated implements has declined. The role of public and private sectors has been found to vary from input to input. The role of private sector was more pronounced in seed (in particular on high value-low volume crops) and fertilizer production, whereas commercial banks were the key players in

institutional credit. The pesticide and tractor industries were completely in the hands of private sector. In the recent period, the cooperative sector's share has increased in fertilizer production, accompanied by a decline the private sector's share." As per the survey only 40% of the households have access to the agriculture information. Of them also the progressive farmers are the ones accessing the information. The information does not appear to be coming from public extension service.

Venugopal, P. (2004) as part of the Millennium Study on the "State of the Indian Farmer" commissioned by the Ministry of Agriculture, Government of India, focuses on the major policy issues that have impacted the usage of agricultural inputs (fertilisers, seeds, pesticides and agricultural machinery) from 1950 to 2000. In order to provide a farmers' perspective the demand and supply factors were studied by applying the 4Ps of marketing (product, price, place and promotion). The information obtained from existing data sources and research material was also analysed to see variations across different time periods and across market segments based on farm-size and region. The study provided a historical perspective of 50 years of agricultural input usage in the country to the planners in the coming decades.

Report of the working group on Crop husbandry, agricultural inputs, Demand and supply projections and agricultural statistics for the twelfth five year Plan (2011), elaborately discussed the demand and supply of fertilizers, seeds, and other inputs. In India, consumption of fertilizers has been increasing over the years and today India is the second largest consumer of fertilizers after China, consuming about 26.5 million tonnes of NPK. It accounted for 15.3 per cent of the world's N consumption, 19 per cent of phosphatic (P) and 14.4 per cent of potassic (K) nutrients in 2008. However, average intensity of fertilizer use in India remains much

lower than most countries in the world and is highly skewed, with wide inter-regional, inter-state, and inter-district variations.

The importance of fertilizers in yield improvement, which is essential for achieving increased agricultural production, further increases because there is little scope for bringing more area under cultivation as well as majority of Indian soils are deficient in many macro and micro nutrients.

The use of fertilizers especially in High Yielding varieties (HYV) is very critical. It is imperative to apply major, minor and micro nutrients through correct method and time of application, is key to achieve increased and sustained crop production. Therefore it is worth ascertaining from the farmers about the timely and quality supply of fertilizers.

The working group further states “Seed is a basic and critical input for agricultural production. Quality seed broadly refers to seed of improved variety with high genetic and physical purity, high quality germ in ability and vigour, free from seed borne pathogens, need based value addition and long shelf life and high storability. It is estimated that improved varieties with good quality seed contribute over 40 per cent to total crop production where quality seed alone constitute 10-20 per cent. Inadequate availability of quality seeds, planting material and germplasm are major constraints limiting productivity”.

Supply of quality seeds, fertilizers and pesticides is therefore absolutely essential for increasing productivity of crops and total agricultural production. This is an important factor in value chain management. Any deficiency in the supply of inputs will weaken the value chain. Though supply of these inputs comes from various agencies including public and private, the farmer needs to be judicious in procuring the good quality inputs from the supply channels to better the yields.

Therefore, it is important to study whether the farmer is getting timely and quality seeds to improve this part of value chain.

## 2.5 Infrastructure

Infrastructure in agriculture plays a very important support function to the farmer in his farming activity. Several researchers have done work in this aspect. They have dealt in detail about the basic services like power, irrigation and rural road connectivity for the enhancement agricultural productivity.

The Agricultural Development and Rural Transformation unit of the Institute for Social and Economic Change, led by Venkatachalam (2003), carried out a study of 'Infrastructure and Agricultural Development in Karnataka State' in 2003. The objectives of the study are:

i) To estimate the trends in major components of infrastructure for agricultural development and in the country across major states
ii) To analyse the level of development of various agricultural infrastructural indicators across different districts in Karnataka so as to understand the disparity in infrastructure development.
iii) To provide broader policy suggestions on infrastructure development in Karnataka state.

As per the study, the agriculture infrastructure includes all of the basic services, facilities, equipment, and institutions needed for the economic growth and efficient functioning of the food and fibre market. The infrastructure in the agricultural sector enhances the 'comparative advantages' of that region in which the infrastructural investment is made. The study identified several advantages to a region endowed with adequate infrastructure. Some of them are:

i) Infrastructure increases Agricultural production and productivity;
ii) Infrastructure reduces cost of production. For example, the transportation cost incurred by the farmers in particular region, both for transporting inputs to the field from the place of purchase and transporting the output to the market place for final sale, can be substantial in the absence of proper transportation facilities,
iii) Introduction of new technology such as sprinkler irrigation in a region may reduce the exploitation of ground water in that region and this would make more amount of ground water available for down streams farmers, several miles away. This would probably save the marginal cost of digging bore wells, preventing failure of wells etc. that would save considerable cost to the farmers down streams.
iv) With regard to Infrastructure and the Economies of scale, provision of one particular infrastructure for the specific objective may result in satisfying multiple objectives thereby increasing the economies of scale in the production activity. For example, Construction of Rural roads network and rural electrification lead to growth of small scale industries.

An empirical study by Binswanger et al (1993) demonstrated that increased marketing infrastructure that includes components such as road Infrastructure reduces cost of production. He said the infrastructure facilities in India also enhanced the total agricultural output and with an elasticity of 0.20.

An empirical study by Ahmed and Hussain (1990) demonstrated that the fertilizer usage in the agricultural sector increases with the improvement in the quality of the road.

The studies made by Omamo 1998; Zeller et al. 1998 had shown that lack of transport infrastructure results in low technology adoption, cropping

choices and low agricultural productivity in developing countries, while price policies with respect to transport pricing might lead to distorting signals.

For example, Gersovitz (1989, 1992) shows how territorial pricing affects transport investment strategies while Masters and Nuppenau show liberalization accompanied by increased infrastructural development would improve efficiency and equity in the case of production of maize in Zimbabwe.

Rakesh Mohan (2004) eloquently puts it “As mere policy reforms in these areas would be inadequate, corresponding investment in rural infrastructure is required for closer connection between the farmer and the market. The government has already launched an ambitious rural roads programme, namely the Prime Minister’s Gram Sadak Yojana (PMGSY) .The experience of states like Tamil Nadu, Punjab, Haryana, Kerala andGoa, where rural connectivity through roads was achieved much earlier,suggests that such a programme is more successful when conducted in a decentralised framework. Heavy investments need to be made in establishing cold chains across the country such as cold storage, transport facilities and the like. The kind of storage and transportation facilities required will differ from product to product and from region to region. It would be best accomplished in a decentralised private sector framework with appropriate policies and supportive financing facilities.”

The above discussion indicates that the provisioning of infrastructure improves the management of value chain by improving the agricultural production and reducing costs. Therefore it is worth studying the extent of provisioning and adequacy of these infrastructure facilities such as power, irrigation and rural road connectivity for supporting the farmer in managing his value chain.

## 2.6 Mechanisation of agriculture

Mechanization helps in performing the agricultural activities with ease, precision and on time. Certain of the farming activities need to be performed in time, and labour availability could be a problem since all the farmers take up the agricultural activities around the same time and during those peak time using machines to perform the functions becomes a necessity. Many researchers have dealt with the needs for mechanization, various aspects of mechanisation and how important mechanization is in agriculture.

Kulkarni (2006) dealt with various aspects of mechanization in agriculture. The study is based on secondary data. The author observed that major research achievements in agriculture engineering have been devising methodology and equipment for tillage, sowing, inter culture, harvesting, threshing, soil resource conservation, on-farm water conservation and management, proper land use, enhancement in cropping intensity to 1.37. About 300 improved agricultural equipment / technologies have been developed country wide for various pre and post-harvest operations by human and animal, mechanical and electrical power, modernization of rice, wheat, oil and sugar cane milling industry to some extent, development of technology for value addition and for health and nutrition security.

One of the problems facing the agriculture sector has been non availability of man power during peak crop season. Mechanization of agriculture would resolve this problem to a great extent. Farm mechanization has a positive relation to farm productivity, firstly through timeliness of farm operations and secondly through good quality and precision work. Mechanization is an important factor in value chain.

According to Kulkarni, "Effective engineering interventions and inputs have the potential to result in further useful technology packages" for:

i) Timeliness and precision in farm activity
ii) Mechanization for dry land and hill agriculture and horticulture.
iii) Efficient use of water, fertilizer, seed pesticide, energy and other inputs.
iv) Using bio-mass for alternative economic power sources.
v) Post-harvest loss minimization to ensure availability of more food, fruits, vegetables and nutrition to population.
vi) Primary processing of agro produce and cold chain activities to enhance employment and income generation opportunities.
vii) Overall contribution to employment generation in different areas of agriculture, for unemployed rural youth and women.

The sub-group on Agricultural implements and Machinery for Formulation of 9th 5 year plan, GOI, identified the economic advantage of mechanisation which is furnished in the following table below:

Table 2.1

| **Economic advantage of Mechanization** | |
|---|---|
| Increase in productivity | In Percentage |
| Seed cum fertilizers drill facilities | 12-34 |
| Saving in seeds | 20 |
| Saving in fertilizers | 15-20 |
| Enhancement in cropping intensity | 5-22 |
| Increase in gross income of farmers | 29-49 |

Source: Report of the sub-group on Agricultural Implements and machinery for formulation of the 9th Five Year Plan, Government of India (GOI).

The report attempted to quantify the economic advantage of mechanization. As per the report there are substantial savings for the farmers apart from increase in productivity. The report further makes an

observation that the land levellers, seed-cum-fertilizers drills have been accepted by farmers but on a limited scale.

The above emphasizes the importance of mechanization in increasing productivity and reducing costs and becomes an important link in the value chain. Marginal and small farmers may not be able to purchase the farm equipment due to poor financials. It is therefore worth studying the penetration of mechanization in agriculture.

## 2.7 Technology Development and Transfer

Technology development and transfer in agriculture is of paramount importance. The technology in agriculture spans over various aspects of agriculture, right from fertility to seed technology, to planting technology to agronomical practices, plant protection technology , inter cultivation to harvesting and post harvesting technology. It facilitates the increase in yields as well as marketing the produce. There are research articles on Technology Development and Transfer in agriculture, which covered various aspects of technology. One of the important ones of them is the experience of International Crop Research Institute for Semi Arid Tropics (ICRISAT).

Nigam et al (1996) discussed ICRISAT'S experience and role in technology transfer involving national programs with particular reference to Legumes on-farm Testing and Nurseries and Asian Grain Legumes on-farm Research programmers in their paper "Technology Development and transfer in Agriculture".

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According to Nigam "Scientific knowledge, when put to routine use for the benefit of mankind, is called technology. Any new technology to find acceptance must be competitive in today's and tomorrow's environments, and bring about economic benefits at all levels of a society while maintaining eco-friendliness, self-sustainability of the system and social

and cultural compatibility", and "technology development is an on-going response of scientific knowledge to changing requirement of society. It focuses on a target group keeping in mind the resource base, socio-cultural factors and government policies to exploit the available opportunities and match scientific knowledge with requirements".

The author opined that "in the current agricultural context, the development of a new technology involves increasing productivity at the farm level in an eco-friendly and sustainable manner. A simplistic approach is to first identify those constraints that affect production at the farm level, and to devise appropriate solutions to overcome them."

An effective technology transfer system requires a carefully thought out plan, clearly communicable ideas, and a cooperative effort. It should be capable of dealing with a wide spectrum of ground realities. In each situation, the fundamentals of the process remain the same, only operational considerations and implications vary. Technologies compatible with full needs, economic and socio cultural factors, and governmental policies are amenable to effective transfer.

Over the past 40 years, various reasons have been given for the failure of resource-poor farmers to adopt new technology. In the late 1980s and early 1990s, it was realized that the available technology did not match the goals of resource-poor farmers because they did not participate in planning and evaluation of technology (Chambers et al 1989).

The authors suggested that the current emphasis, therefore, is on farmers' participation in the process of technology development and adaptation.

Technology Development and Transfer plays a very important role in maximising yields by selecting the best variety of crop, testing the soil and

applying fertilizers based on systematic planning, adopting the improved plant protection measures and finally marketing the produce. It also serves as solution to the problems faced by the farmers in their respective local situations. It helps the farmers as a support to manage his value chain. Development of technology and its transfer some times may increase the benefits exponentially. It is also important that the Technology Development is based on the local needs and with the co-operation and collaboration of the farmers who need them the most as per ICRISAT`s experience, well captured by Nigam. Therefore it is worth studying the Technology that is reaching the farmer and its availability, adaptability and affordability at farmer level. Discussion above on Technology development and Transfer necessitates a study as to how far they are reaching the farmer and how far he is adopting it and getting benefited. It is of importance to study the facilitating and inhibiting factors in adoption of Technology. In maximising the value chain of the farmer, technology plays a crucial role.

## 2.8 Extension Services

Extension service in agriculture context is to disseminate the knowledge and skills from the source viz.: Public and private Research Organizations, Central and State Agricultural Universities, Central and State Governments through their ministries of agriculture to the farmers. There are various government programmes in the space of extension services which were conceptualised, implemented at various levels in the past. Agricultural extension is aimed at promoting agricultural development by providing information on improved production technologies and their adoption.

The Directorate of Extension (DOE) is a national agency that implements specific programmes and activities. Agricultural extension is primarily the responsibility of state departments of agriculture (SDAs). The Directorate of Extension works in collaboration with SAUs and Indian Council of

Agricultural Research (ICAR) and such other institutes. The programmes and activities of the Directorate are in areas like extension management, extension training, farm information and farm women's development.

The Extension Management Unit of the Directorate operates the Central Sector Scheme "Strengthening of Agricultural Extension Services," which includes Non- Government Organizations (NGOs) in the extension network. The Unit also monitors and implements the "Innovations in Technology Dissemination" component of the World Bank-aided National Agricultural Technology Project (NATP). This scheme strengthens the training infrastructure, including the National Institute of Agricultural Extension Management (MANAGE), four regional Extension Education Institutes (EEIs) and 15 Centres of Excellence in Training (CETs) established at ICAR/SAUs and other Central Institutes to provide training in various areas. The Farm Information Unit of DOE extends information support through the Central Sector Scheme on "Information Support/Management Information System," which organizes exhibitions, shows, and fairs Extension workers are the most important source in transmitting technology to users.

According to Malhan et al (2007) Agriculture is a mainstay of the economy, and it is the role of government to motivate and advise the farmers about new developments in agriculture. To achieve that objective, the government set up various institutions, agricultural universities, centres, and agencies such as T&V (Training and Visit), other extension agencies such as Krishi Vigyan Kendras (KVKs)

Sharma (2003) states that, “Quick dissemination of technological information from the Agricultural Research System to the farmers in the field and reporting of farmers' feedback to the research system is one of the critical inputs in transfer of agricultural technology. The information and

communication support during last 55 years has mainly been conventional. The extension personnel of the Department of Agriculture disseminated the technological messages to the farmers manually. Through this approach information has not been able to reach majority of the farmers who are spread across the whole country. This gap remains a challenge for the Extension system even today. ... Farmers' needs are much more diversified and the knowledge required to address them is beyond the capacity of the grass root level extension functionaries”

Another technology that is gaining farmers' confidence is satellite-enabled mobile videoconferencing. The National Institute of Agricultural Extension Management (MANAGE) is an apex national institute set under the Ministry of Agriculture, Government of India. It assists the State Governments, the Government of India and other public sector organizations in effective management of their agricultural extension and other agricultural management systems. National Institute of Extension management (MANAGE) has had more than 100 videoconferencing sessions with farmers and their farm families. They send the Mobile VSAT Van to remote locations and a crew sets up the videoconferencing within one hour. They then connect to MANAGE using satellite Connectivity. MANAGE invites university scientists and employees working for the crops/agro-climatic offices of that area to answer farmers' queries. All the interactions are in the local language. The impact of this connectivity has been beyond expectations. They are also pilot-testing the efficacy of WLL technology to provide last mile connectivity in Amravati District of Maharashtra (Sharma 2003).

ITC, one of India's largest exporters of agricultural commodities, launched "e-Choupal", in June 2000. It serves more than 3.1 million farmers growing a range of crops in over 31,000 villages through 5,050 kiosks across six states. And it enables the agricultural community access

information in their local language on the weather and market prices, disseminate knowledge on scientific farm practices and risk management, facilitate the sale of farm inputs (now with embedded knowledge), and purchase farm produce from the farmers' doorsteps. Decision making is now information-based.

According to Malhan et.al (2007), the Ministry of Agriculture, Government of India, in association with National Bank for Agriculture and Rural Development (NABARD) has launched a unique programme to take better methods of farming to farmers across the country. The objective is to provide the farming sector with state-of-the-art knowledge and technology inputs through these self-employed agricultural consultants, and to strengthen the government extension system, which has been stretched beyond capacity in the past few decades.

The institution that bridges the gap between farmers and agricultural research scientists is the Agricultural Extension Service. This service works through an Agricultural Research System in the States. The main objective of Agriculture Extension Services or AES's is to transmit latest technical know-how to farmers. Besides this, the AESs also focuses on enhancing farmers' knowledge about crop techniques and helping them to increase productivity. This is done through training courses, farm visits, on farm trials, kisan melas, kisan clubs, advisory bulletins and the like.

As per www.archive.gov.in, for strengthening agricultural extension and transfer of technology to farmers, farmers clubs are being formed in every village in Andhra Pradesh. These clubs consist of innovative farmers, progressive farmers and farmers' interest groups. One innovative farmer of each club acts as the convenor or contact person. These farmers work together to ensure the success of group centric farming practices such as

organizing a pest control campaign. The state Agricultural Department also established various centres for the training of the extension personnel.

### 2.8.1 Krishi Vigyan Kendras (KVK)

Education Commission (1964-66) recommended that a vigorous effort be made to establish specialized institutions to provide vocational education in agriculture and allied fields at the pre and post matriculate levels to cater to the training needs of a large number of boys and girls coming from rural areas. The commission further suggested that such institutions be named "Agricultural Polytechnics". The recommendation was thoroughly discussed by the Ministry of Education , Ministry of Agriculture , Planning Commission, Indian Council of Agriculture research (ICAR) and other allied institutions. Finally ICAR mooted the idea of establishing Krishi Vigyan Kendras (KVK) - agri-science centres as innovative institutions for imparting vocational training to the practising farmers , school drop outs, and field level extension functionaries. The first KVK, on a pilot basis was established in 1974 at Puducherry (Pondicherry) under the administrative control of the Tamil Nadu Agricultural University, Coimbatore.

Krishi Vigyan Kendra, a plan scheme designed and nurtured by ICAR for the past four decades, is playing a vital role as it has the following unique features:

- Creation of valuable resources in terms of technical manpower and assets
- Confirmation of technologies to suit local specificity
- Showcasing the frontier technologies
- Capacity building among stakeholders
- Front runner in technological application, information and inputs
- Participatory approaches in planning, implementing, executing and evaluation

All KVKs are working towards reducing the time lag between generation of technology at the research institution and its application to the location specific farmer fields for increasing production, productivity and net farm income on a sustained basis with the following mandate.

Mandate for KVK:

Application of technology/products through assessment, refinement and demonstration for adoption is the mandate given to KVKs. To achieve the mandate effectively, the following activities are envisaged for each KVK:

i) On-farm testing to identify the location specificity of agricultural technologies under various farming systems.
ii) Frontline demonstrations to establish its production potentials on the farmers' fields.
iii) Training of farmers and extension personnel to update their knowledge and skills in modern agricultural technologies.
iv) Work as resource and knowledge centre of agricultural technologies for supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district.
v) Produce and make available technological products like seed, planting material, bio agents, young ones of livestock etc. to the farmers
vi) Organize extension activities to create awareness about improved agricultural technologies to facilitate fast diffusion and adoption of technologies in agriculture and allied sectors.

The above information was sourced from Tamilnadu Agricultural University (TNAU)

In the area of extension services in agriculture sector, as discussed above there are many institutions and programmes initiated to disseminate knowledge from the source to the farmers, it may be of importance to

study whether these intentions and efforts resulted in the farmer receiving them effectively.

### 2.8.2 Information and communication technology in Extension

Singh et. al. (2003) talked about the role of radio, television, publications, tele-conferencing and internet technology in accomplishing the extension function for transfer of farm technology to the farmers in his article Indian Economic Panorama. 12(4), 29-30.

As per Kumar et.al (2002) Internet plays a major role in the transfer of high-tech agriculture technologies from global pocket to farmers' field. In developing countries, the use of the Internet in farm decision-making is much less. Only 12% of farmers use this technology, and the majority of them use traditional technologies like radio (77.3%) and newspapers (11.3%).

According to Cecchini, (2002) and Vashista (1987), agricultural extension agencies must make farmers aware of the use of the Internet in technology transfer. This can help farmers keep pace with rapidly changing agricultural technologies.

The Union Agriculture Ministry is considering a proposal to revamp the ICAR along the lines of the Council of Scientific & Industrial Research, to bridge the gap between technology generation and technology dissemination, since 60 per cent of farmers have no access technology as revealed by the latest National Sample Survey Organization report (Suryamurthy, 2005).

The Information and Communication Technology (ICT) is gaining currency in various fields including agriculture sector. It could be in weather forecast information market information, problem solving in

agriculture, solving farmers` problems at the filed level. How far the ICT has reached farmers and how the farmer is benefited in his value chain is worth studying.

## 2.9 Agricultural Credit in India

Thejeswini et al (2014) in their paper described various financial products and discussed the delivery of products and services. The study was based on secondary data. After financial sector reforms were introduced in India, several important innovations took place in agricultural credit (Subba Rao, 2012). The concept of forming 'farmers club' which was initiated in 1982s was revived in 2007-08. The activities of technology transfer, credit facilitation and counselling, market advocacy, market support and input facilitation have been taken up by a large number of Farmers Clubs across the country, across various agro- climatic zones and across various regions and communities. This proves the fact that it is an institutional innovation, which can be mainstreamed, irrespective of the specific nature of an area or the profile of the members (Satish, 2011). In 1989, the National Bank for Agriculture and Rural Development (NABARD) introduced Kisan Credit Card (KCC) which a farmer could use to draw credit for all production needs, almost as if on tap, through the production cycle. The Department of Financial Services, Ministry of Finance, Government of India, constituted a working group to review the KCC Scheme with a view to suggest changes to make it a smart-cum-debit card. As per the new KCC Guidelines (2012), all KCC customers should have the facility of withdrawal through ATM/Debit cards. NABARD, in January 2013 set up SPU-KCC (Special Project Unit-Kisan Credit Card) with a mandate for encouraging co-operative banks and RRBs across the country to issue Rupay KCC Debit cards.

The Self-Help Group (SHG) - Bank Linkage Programme stands out amongst the process innovations. This initiative of NABARD was a

supplementary credit delivery mechanism for the sections of the population who have been left out of the purview of formal financial institutions and who have been considered as non-bankable. NABARD has explored other innovative alternatives to SHGs. In this effort, the Joint Liability Group (JLG) approach pioneered by a Bank for Agriculture and Agricultural Co-operatives (BAAC), in Thailand has been viewed as a viable approach. The JLG model too was taken up on a pilot basis in 2005-06 and it was later introduced as a mainstream banking process in 2008-09. Regional Rural Banks have played an important role in providing agricultural credit. (Satish, 2012)

In 2004, a 'Comprehensive Credit Policy' was announced with a mandate of doubling the agricultural credit, as a part of the Government`s strategy to boost agricultural production. The programme envisaged accelerated expansion of Kisan Credit Cards, financing of new investments, rescheduling and restructuring of loans/debts in areas affected by the natural calamities, one time settlement (OTS) for farmers in distress, redemption of loans from informal sources and also to step-up institutional credit to agriculture by 30 per cent every year. Also, banks were enjoined to ensure that every branch finances at least 100 farmers (5 million farmers at the aggregate level) and at least two or three agricultural projects every year. (Thejeswini et al, 2014)

Crop loans, up to an amount of Rs. 3.00 lakh, are being provided effectively at an interest rate of 4 per cent per annum - accounting for the rebate of 3 per cent for timely repayment of loans, besides the interest subvention. An interest subvention scheme was introduced in 2006-07 on the short-term credit at the rate of 7 per cent extended to farmers. The budget for 2011-12 announced an additional subvention of 3 per cent for prompt repayment by farmers. The benefit of interest subvention has been extended to small and marginal farmers having Kisan Credit Card for a

further period up to six months post-harvest, against negotiable warehouse receipt for keeping their produce in warehouses to avoid any distress sale. If further state support is reckoned, in some states crop loan is available at zero per cent (under certain terms). The limit of collateral-free loan has been increased from Rs. 50,000 to Rs.100,000 (NABARD, Annual Report 2012-13).

The institutional credit has been conceived to play a pivotal role in the agricultural development of India. A large number of institutional agencies are involved in the disbursement of credit to agriculture. However, the persistence of money lenders in the rural credit market is still a major concern. In their study Anjani Kumar et al (2010) examined the performance of agricultural credit flow and identified the determinants of increased use of institutional credit at the farm household level in India. The study based on the secondary data compiled from several sources, has revealed that the institutional credit to agriculture in real terms has increased tremendously during the past four decades. It covers among others:

i) Inventory Financing and Ware House Receipts Financing
ii) Supply /Value Chain Financing
iii) Leasing
iv) Contract Farming
v) Producer Companies

Rakesh Mohan (2004) summed up on agricultural policy thus:
"Concern with the inadequacy of agricultural credit has had more than a century of tortuous history. The agricultural credit system has been a product of both evolution and intervention and symbolises the system's response to the stimuli from continuing dissatisfaction with credit delivery. The concern for food security and the need for building up buffer stocks, which guided the Green Revolution, created both enhanced and diversified

type of credit requirements for agricultural production. In India, a "supply-leading approach" to the institutional development for agriculture credit has been followed." "What have we learnt from this brief summary of the record of agricultural credit? First, after about 70 years of constant efforts, institutional credit is indeed reaching a substantial proportion of farmers. Second, with the share of agricultural GDP falling in total GDP, it is to be expected that the share of agricultural credit will go down as a proportion of total credit. But we do need to ensure that it does not fall as a share of agricultural GDP, and that it in fact intensifies. Third, what is needed is a better analysis by banks on where the risks are in the extension of agricultural credit, and to then find market oriented solutions for mitigating such risks. Where the mitigation of such risk involves positive externalities and the promotion of public good, methods of appropriate government intervention would need to be identified and considered. Fourth, there is an urgent need for the adoption of the best modern techniques for risk management in agriculture, including a clearer distribution between risky and less risky borrowers. Fifth, banks need to adopt a more specialised approach as between different agricultural sectors and regions in order to achieve a better understanding of agricultural credit needs and risks on a disaggregated basis: which sectors and regions are more credit worthy and which less so? Which agricultural activities and regions are getting more credit and why? Business as usual and a blanket approach will no longer do. Sixth, there is an increasing need for allied activities and term lending, and hence a change in our traditional view of what constitutes agriculture and how it should be promoted. "A review of performance of agricultural credit in India reveals that though the overall flow of institutional credit has increased over the years, there are several gaps in the system like inadequate provision of credit to small and marginal farmers, paucity of medium and long-term lending and limited deposit mobilisation and heavy dependence on borrowed funds by major agricultural credit purveyors. The difference now is that we need initiatives in a disaggregated manner in

many different segments of agriculture and agro industry: horticulture, aquaculture, pisciculture, dairying, sericulture, poultry, vegetables, meat, food processing, other agro-processing and the like. So what we need to do is to initiate a nationwide major mission programme for different activities, regionally disaggregated, in a similar package mode. The packages will have to be different for each activity and location".

Narayan Chandra Pradhan (2013) observed that rural credit markets in India is characterised by the coexistence of both formal and informal sources of finance and the market is fragmented. It is assessed that the share of rural informal credit in total outstanding debt has been certainly decreasing over the period from 1950 to 2002 with various financial inclusion initiatives of the Reserve Bank and legislations of the various state governments to regulate moneylenders. However, about two-fifth of the rural households' dependence on informal credit, even today, indicates further scope for financial inclusion in rural areas.

The Report of the Task Force on 'Credit Related Issues of Farmers' (2010) has observed that "…more disquieting feature of the trend was the increase in the share of moneylenders in the total debt of cultivators. There was an inverse relationship between land-size and the share of debt from informal sources. Moreover, a considerable proportion of the debt from informal sources was incurred at a fairly high rate of interest". About 36 per cent of the debt of farmers from informal sources had interest ranging from 20 to 25 per cent. Another 38 per cent of loans had been borrowed at an even higher rate of 30 per cent and above, indicating the excessive interest burden of such debt on small and marginal farmers. The continued dependence of small and marginal farmers on informal sources of credit such as private moneylenders was attributed to constraint in the rural banking network and services arising out of financial sector reforms. Rigid procedures and systems of formal sources preventing easy access by small

and marginal farmers, vied with the easy and more flexible methods of lending adopted by informal sources. The Task Force members came across situations where farmers were borrowing at the rate of five to ten per cent per month. The identification of farmers indebted to private moneylenders is difficult. Such loans in most cases have no formal records and identifying and authenticating the debt from moneylenders may lead to problems of moral hazard (GOI, 2010). According to the Report, credit needs of small and marginal farmers are not only growing but are getting diversified due to increasing commercialization and modernization of agriculture. Simultaneously, for a variety of other needs, farmers incur considerable expenditure, resulting in increased borrowings. Adequacy, timeliness, affordability and convenience are factors that influence farmers, and for that matter, all borrowers, in their choice of creditors. Given that a single source may not to be able to satisfy all their credit needs, many farmers approach both formal and informal sources. Invariably, those who cannot afford any collateral are forced to borrow from informal sources. The Task Force reviewed the debt swap schemes of banks and revealed that these schemes had limited success as farmers were reluctant to disclose the name of the money-lenders, apprehensive in disclosing debt and some had even repaid the existing debt out of their Kisan Credit Card limits. Even though the Task Force came across some good debt swap schemes, bankers reported difficulty in taking these to scale and also reported that there was little guarantee that farmers would not ever again borrow from moneylenders.

In this regard, Jeromi (2007) attempted to analyse the working of moneylenders in Kerala based on a sample survey, and mentioned that the existing legal provisions and regulatory and supervisory mechanisms are inadequate to protect the interests of both depositors and creditors in rural Kerala.

The growing commercialization of Indian agriculture has encouraged the rise of trader-moneylender, as the formal sector finance is inadequate to meet the growing credit requirements of agriculture.

The Task Force (GOI, 2010) noted that the moneylender today comes in many forms - as an outright lender, as a supplier of inputs/consumer goods, as a for-profit non-banking finance companies (NBFCs) including the for-profit MFIs, as a buyer of produce, and as an owner of the land on which the farmer is dependent. The sheer numbers of moneylenders, easy access to them, and their intricate relationships with the borrowers coupled with limited access to formal institutions made it difficult for borrowers to complain against them.

There are several agencies-governmental or co-operative or private, from which the farmer sources his credit. Depending on the source the cost of funds may change. More borrowing from private money lenders may lead to higher costs and hurt profitability and hence the government promotes formal credit mechanisms to improve the value chain in agriculture. Therefore it is necessary to study whether the farmers are using formal or informal sources of credit and how they are getting support from the financial institutions.

## 2.10 Agricultural Insurance

S.S. Raju and Ramesh Chand (2008) observed that in the absence of formal risk sharing / diffusion mechanisms, farmers rely on traditional modes and methods to deal with production risk in agriculture. Many cropping strategies and farming practices have been adopted in the absence of crop insurance for stabilizing crop revenue. Availability and effectiveness of these risk management strategies or insurance surrogates depend on public policies and demand for crop insurance (Walker and Jodha 1986). The risk bearing capacity of an average farmer in the semi-

arid tropics is very limited. A large farm household or a wealthy farmer is able to spread risk over time and space in several ways. He can use stored grains or savings during bad years; he can diversify his crop production across different plots. At a higher level of income and staying power, the farmer would opt for higher average yields or profits over a period of time even if it is achieved at the cost of high annual variability on output (Rao et al., 1988). Binswanger (1980), after studying the risk in agricultural investments, risk averting tendencies of the farmers and available strategies for shifting risk, concludes that farmers‟ own mechanisms for loss management or risk diffusion are very expensive in arid and semi-arid regions. The major role played by insurance programmes is the indemnification of risk-averse individuals who might be adversely affected by natural probabilistic phenomenon. The philosophy of insurance market is based on large numbers where the incidence of risk is distributed over individual. Insurance, by offering the possibility of shifting risks, enables individuals to engage in risky activities which they would not undertake otherwise (Ahsan et al., 1982).

Farmer cannot influence the natural calamities which damage his crop. The insurance companies will have some knowledge about them from previous data. They try to cover large number of farmers so that their reimbursement in limited areas will indemnify them from losses. Agriculture being bio-process, the possibilities of poor yields are always there and also vagaries of monsoon play an important role in the yields and production. Lack of accurate data also is an impediment to insurance companies as well. If they charge higher premia, the farmer may be reluctant to insure. Risk diffusion mechanisms like crop diversification, adding allied farm activities like dairy and fishery to the crop will help the farmer to maximize his returns. Especially in semi-arid areas cost of risk mitigation is more expensive due to water scarcity conditions.

Jodha (1981) finds that the riskiness of farming impinges upon the investment in agriculture leading to suboptimal allocation of resources. He also finds that official credit institutions are ill equipped to reduce the exposure of Indian farmers to risks because they cannot or do not provide consumption loans to drought-affected farmers. Insuring large number of farmers, crops and over years distributes the risk for the insuring companies. Farmer reduces his risk by insuring and he may also prefer to adopt newer technologies since insurance is available there by increasing the chances of higher production.

Crop credit insurance also reduces the risk of becoming defaulter of institutional credit. The reimbursement of indemnities in the case of crop failure enables the farmer to repay his debts and thus, his credit line with the formal financial institutions is maintained intact (Hazell et al., 1986, Pomareda 1986; Mishra 1996). Farmers need not avail credit from private money lenders and need not resort to distress sale of the produce and the chances of his default is less and consequently the government may avoid large write offs of the farm credit in case of crop failure.

A properly designed and implemented crop insurance programme will protect the numerous vulnerable small and marginal farmers from hardship, bring in stability in the farm incomes and increase the farm production (Bhende 2002). The farmer is likely to allocate resources in profit maximizing way if he is sure that he will be compensated when his income is catastrophically low for reasons beyond his control. A farmer may grow more profitable crops even though they are risky. Similarly, farmer may adopt improved but uncertain technology when he is assured of compensation in case of failure (Hazell 1992). This will increase value added from agriculture, and income of the farm family. Access and availability of insurance, changes the attitude of the farmer and induces him to take decisions which, otherwise, would not have taken due to

aversion to risk. For example, rain-fed paddy was cultivated in one of the riskiest districts i.e., Anuradhapur district, of Sri Lanka, for the first time in 1962, as insurance facility was available to the farmers (Ray 1971). Bhende (2005) found that income of the farm households from semi-arid tropics engaged predominantly in rain-fed farming was positively associated with the level of risk. Hence, the availability of formal instrument for diffusion of risk like crop insurance will facilitate farmers to adopt risky but remunerative technology and farm activities, resulting in increased income. Some of the studies confirm the conventional view that moral hazard incentive lead insured farmers to use fewer chemical inputs (Smith and Goodwin 1996). Babcock and Hennessy (1996), find that at reasonable levels of risk aversion, nitrogen fertilizer and insurance are substitutes, suggesting that those who purchase insurance are likely to decrease nitrogen fertilizer applications. A study by Horowitz and Lichtenberg (1993) find that in the US Midwest, crop insurance exerts considerable influence on maize farmers' chemical use decisions. Those purchasing insurance applies significantly more nitrogen per acre (19 %), spend more on pesticides (21 %), and treats more acreage with both herbicides and insecticides (7 % and 63 %) than those not purchasing insurance. These results suggest that both fertilizer and pesticides may be risk-increasing inputs.

An analysis of data from US agriculture indicates that the producer's first response to risk is to restrict the use of debt. Price support programmes and crop insurance are substitutes in reducing producer risk. The availability of crop insurance in a setting with price supports allows producers to service higher levels of debt with no increase in risk (Atwood et al., 1996). Mishra (1994) analysed the impact of a credit-linked Comprehensive Crop Insurance Scheme (CCIS) on crop loans, especially to small farmers in Gujarat. It is observed that CCIS had a collateral effect as reflected through the increased loan amount per borrower and reduction in the

proportion of non-borrowers among small farmers. The implications of credit expansion are that increased availability of credit can enhance input use and output and employment that increased share of small farmers in the total loan can have desirable effects on equity and efficiency considerations. Though crop insurance is based on area yield, it insures the loan amount. This leads to improved access of small and marginal farmers to institutional credit. In the event of crop failure or drought, loan is repaid in the form of indemnity and thus there is reduction in the cost of recovery of loans to lending institutions and reduction in the overdue and defaults. It is observed that insured households invest more on agricultural inputs leading to higher output and income per unit of land. Interestingly, percentage increase in output and income is more for small farms. Based on 1991 data, CCIS was found to contribute 23, 15, and 29 per cent increase in income of insured farmers in Gujarat, Orissa and Tamil Nadu, respectively (Mishra 1994). Many of the risks insured under public insurance programme are essentially un-insurable risks. Moreover, they occur frequently and hence are expensive to insure. The financial performance of most of the public crop insurance has been ruinous in both developed and developing countries. The multi-peril crop insurance thus is very expensive and has to be heavily subsidized (Hazell 1992).

While agricultural insurance helps in managing the risk factor in agriculture, it has to be assessed as to whether the farmer at ground level is knowledgeable about crop insurance and whether he is using the insurance part to his betterment in the value chain. It is also to be seen whether he is getting the reimbursement of insurance when crop losses occurred beyond his control.

## 2.11 Agricultural Marketing

According to Vadivelu and Kiran (2013) marketing information is an important support tool in agricultural marketing system. It enables farmers

to decide upon what to grow, to which market the produce to be sent, how long to store the produce.

Subrahmanyam, K.V., and Mruthyunjaya, R (1978) based on their study on marketing of fruits and vegetables in Bangalore suggested for proper dissemination of market intelligence and information through all possible means of communication, for improving the marketing efficiency of fruits and vegetables.

Rahman Muhammad Fazlur, (2003) reported that the growers received low prices in Bangladesh because of lack of market information which resulted in wide inter-market price vacation.

Gunatilka W.D (2003) reported that the private sector played a major role in production and marketing in Sri Lanka while the state sector played a supportive role in facilitating them and for improvement of the living standards of the farmer population.

Rahman (2003) reported that the existing service capability of market information system was very poor in Bangladesh. The limitations were non availability of required information and lack of awareness among farmers with respect to use of available information.

Sreshtha K.B (2003) identified the duplication of efforts, lack of standardization, inadequate network for information flow, lack of co-ordination and integration among various agencies some of the limitations of Market Information System in Nepal. The researcher also reported that the information service served their needs of the policy makers rather than the producers and traders.

Yan Bo and Bu Yibio (2003) studied the agricultural marketing system in China and found that the major information sources of Chinese farmers were other farmers, television and broadcast.

ITC e-Choupal portal launched in June 2000 carries the mandi prices across the state, which up loads daily the prices offered by each of the mandi commission agents who have joined the ITC systems. It also offers the prices that ITC hopes to buy at (www.echoupal.com).

The working group (2011) of Planning Commission of the 12th Five Year Plan on marketing identified condition of existing market

i) Primary or Periodic Markets (haat/ bazaars) are most neglected; basic amenities not available.
ii) Condition of cattle markets most appalling.
iii) Low density of regulated markets in some States; farmers have to travel long distances.
iv) Weak governance of APMCs - management not professional.
v) Licensing systems creates entry barrier to new trader / buyers.
vi) Multi-Point Levy of Market Fee (Varies from 0.5 to 2%) and Multiple Licensing System.
vii) Restrictions on movement of goods inter-state and even intra-state.

The working group (2011) of Planning Commission of the 12th Five Year Plan on marketing identified gaps in Marketing Infrastructure:

i) Only 11 States have taken initiative in establishing 109 cold storages and eight states have established 51 apnimandi's, there is virtually no progress in the setting up of wholesale markets except in Kerala.
ii) Wide gap between rural tele-density (30.18 per cent in November 2010) and urban tele-density (143.95 per cent in November 2010).
iii) Only 1637 grading units at the primary level, which include 125 units with cooperatives and 144 units with others.

iv) Regulated markets, there are only 1368 grading units in a total of 7246 market yards/sub-yards. Only around seven per cent of the total quantity sold by farmers is graded before sale.
v) Scientific storage capacity is only 30 per cent of the required capacity.
vi) Cold storage facility is available for only 10 per cent of fruits and Vegetables.

The working group identified the status of Regulated Markets. Agriculture/agricultural marketing being a state subject, it is the responsibility of respective state governments to take necessary steps for reforming marketing infrastructure. At present farm output is traded through a network of 27,738 wholesale and primary rural markets and 7,157 regulated markets scattered across the states1.Out of the 21,221 rural periodical markets, 15% function under the ambit of regulation. The advent of regulated markets has helped in mitigating the market handicaps of producers-sellers at the wholesale assembling level. But, the Rural Periodic Markets in general, and the Tribal Markets in particular, remained out of its developmental ambit.

The working group identified Major issues and concerns:
i) Too many intermediaries resulting in high cost of goods and services
ii) Inadequate infrastructure for storage, sorting, grading or post-harvest management
iii) Private sector unwilling to invest in logistics or infrastructure under prevailing conditions
iv) Price setting mechanism not transparent
v) Mandi staff ill equipped and untrained
vi) Market information not easily accessible
vii) EC Act impedes free movement, storage and transport of produce

### 2.11.1 Information system in marketing

Vadivelu et al (2013) extensively dealt with various aspects of Agricultural market information and cited the current practices relating to information development and its application.

Sandip Mitra et al (2013) studied middleman margins, trading mechanisms and the role of asymmetric price information between potato farmers and local trade intermediaries, in West Bengal, India. They conducted the experiment in 72 randomly chosen villages in the potato growing areas of Hugli and West Medinipur districts. They were divided into three groups of 24 villages each, used for two information treatments and one groups serving as control. To reduce chances of information spill-overs, villages were selected such that they were at a minimum distance of 8kilometres from each other. Farmers in randomly chosen villages were provided daily price information on prices in neighbouring wholesale markets where the traders re-sell the potatoes. Average trader margins (net of transport and storage costs) in 2008 were at least 50-60% of farm-gate prices. Information provision resulted in no change in average margins, but caused farm-gate prices and traded quantities to shrink (resp. expand) significantly in villages with low wholesale prices. The evidence is inconsistent with long term contracts between farmers and traders. It is consistent with a model of ex post bargaining, in which lack of direct access to wholesale markets depresses outside options of farmers in bargaining with local traders and prevents informational interventions from benefiting farmers.

Ramamrutam et al (2000) developed a system for providing agrarian pricing information to the rural Indian populaces as part of the Media Lab Asia activities at IIT Bombay. The motivation was to empower producers of agricultural commodities with information that allowed them maximize

their revenues by eliminating inaccurate or false information that resulted from the presence of middlemen or agents.

Dhankar G.H., (2003) studied the Agricultural marketing information system network (Agmark net) in India and found that almost all the states and union territories were providing market information in one form or the other for the benefit of the market uses like producers, traders and consumers. However, the information was collected and disseminated by conventional methods which caused inordinate delay in communicating the information to different target groups, and thus adversely affecting their economic interest.

The working group (2011) observed market information system:

- In agricultural marketing, use of marketing information system is indispensable because it is essential for the farmers, traders and consumers for improving the marketing of agricultural commodities.
- Most of the States and Union territories of India are in one way or the other helping the farmers and traders by providing the market information of agricultural commodities by way of publishing in the Newspapers, Magazines and Government Bulletins, transmitting/broadcasting on the Radio, T.V. etc.

The following organizations are involved in providing market prices and other information:

- State Agricultural Marketing Boards/Directorates
- Directorate of Economics and Statistics, Government of India
- Directorate of Marketing & Inspection, Government of India, (AGMARKNET), and
- National Horticulture Board
- FMC and National commodities exchanges (Price Ticker Board)

Rakesh Mohan (2004) observed gaps in the agricultural marketing "The monopoly of Government regulated wholesale markets has prevented development of a competitive marketing system in the country, providing no help to farmers in direct marketing, organised retailing, developing smooth raw material supply systems for agro-processing industries and the adoption of innovative marketing system and technologies".

Marketing the agricultural produce of the farmer is of paramount importance. He may or may not get the right information about the prices and market arrivals to maximise the price realization of his produce. Sometimes even if he receives the information, he may not be in a position to use it for his benefit. All these aspects as to how the farmer is marketing his produce are worth studying and enquiring whether the farmer is maximising his marketing part of value chain.

## 2.12 Value addition and Food Processing

Rakesh Mohan (2004) emphasizes "The changing demand pattern for food involves a reordering of priorities in organising appropriate matching supply responses. Besides promoting diversification, there is also a need for value addition in agricultural production for increasing rural employment and incomes. Interestingly, very significant changes are taking place in the agricultural sector in this regard. There are incipient signs of a much closer connection between primary producers, trade intermediaries, food processing entities, and the eventual marketing of value added products. With the share of unprocessed foods falling, the real growth area in the agricultural sector is in value-added food products such as meat, poultry, fish, vegetables, fruits and the like. There is an accelerating move of consumers to basic processed foods such as atta, packaged milk, fresh poultry, soft drinks, processed meat and poultry, and the like".

In the new growth areas of agriculture, the importance of post-harvest activities such as storage, transportation, processing and marketing of non-cereal products increases which leads to greater links between agricultural diversification and rural industrialisation. The success of this strategy would, however, depend crucially on developing adequate infrastructural and other support systems. Several South-east and East-Asian countries, which adopted agricultural diversification and rural industrialisation as a strategy for rural development, have witnessed a move away from cereals to non-cereal production. This was spurred by the structural changes, which accompanied the long-term contraction of agriculture in the economy, the decline in the real prices of cereals following the success of green revolution, as also the changes in the consumption pattern due to rising incomes and urbanisation.

Goletti (1999) enumerated the agricultural policies and rural development strategies of other countries which incorporated the diversification based on the demand and supply changes.

Rosegrant and Hazell (2011) said that changes in diets of the population of the Asian developing countries played an important role in the evolution of cereal demand and supply and also agricultural diversification.

Agricultural diversification has been seen as desirable response to these demand and supply changes and was explicitly incorporated into many countries' agricultural policies and rural development strategies (Goletti, 1999).Thus, fundamental changes in the diets of the population in Asian developing countries has been a major factor in the evolution of cereal supply and demand and agricultural diversification (Rosegrant and Hazell, 2001).

To sum up, the income and consumption changes, described above, have ushered in a new demand structure for rural products that has gone largely unnoticed. Traditional approaches to agriculture, which focussed on food grain production, will only bring agricultural stagnation and employment distress in rural areas. The need of the hour is to promote agricultural diversification, encourage production of other food products, invest actively in rural infrastructure, and enable greater food processing and value addition to agricultural production, which would create new avenues for rural employment and income.

Food processing is a value added activity post selling of the produce by the farmer. If food processing units are coming up in the nearby areas of the farmer, the farmer may get benefitted with remunerative prices for his produce. Whether there is a benefit to the farmer from the establishment of food processing units near his area is worth studying, which is an addition to the value chain of the farmer.

## 2.13 Agricultural exports

According to data from the commerce ministry, in 2010-11, agricultural exports stood at $17.35 billion, in 2011-12 $27.43 billion, in 2012-13 $31.86 billion and in the first 11 months of 2013-14, it stood at $29.3 billion.

During this four-year period, overall exports recorded 93 per cent growth. The share of agricultural commodities in India's overall export basked rose to 10.66 per cent in 2012-13 from 7.06 per cent in 2009-10.

Table 2.2 (Rising exports of processed food and related products)

| Exports in $ Million | | | | | |
|---|---|---|---|---|---|
| Year | Non-agri | Growth % | Agri | Growth % | % of Total |
| 2005-06 | 95,872 | 24.12 | 7,219 | 14.71 | 7.00 |
| 2006-07 | 117,700, | 22.77 | 8,714 | 20.71 | 6.89 |
| 2007-08 | 149,576 | 27.08 | 13,556 | 55.57 | 8.31 |
| 2008-09 | 170,767 | 14.17 | 14,528 | 7.17 | 7.84 |
| 2009-10 | 166,134 | -2.71 | 12,617 | -13.15 | 7.06 |
| 2010-11 | 233,790 | 40.72 | 17,346 | 37.48 | 6.91 |
| 2011-12 | 278,537 | 19.14 | 27,427 | 58.12 | 8.96 |
| 2012-13 | 268,383 | -3.65 | 32,017 | 16.74 | 10.66 |
| 2013-14* | 252,541 | 4.74 | 29,280 | 1.85 | 10.39 |

*Growth over 2012-13 (April-Feb)

Source: Ministry of Commerce (DGIS, Kolkata) compiled by Business Standard Research Bureau

- During FY 2011–15, India's Exports of processed food and related products (inclusive of animal products) increased at a CAGR of 23.3 per cent to US$ 21.5 billion
- Main export destinations for food products have been the Middle East and Southeast Asia

### 2.13.1 Government Initiatives for agricultural exports

In order to promote food processing industries, increase level of processing and exploit the potential of domestic and international market for processed food products, Vision Document-2015 was prepared by the Ministry of Food Processing Industries. The document envisages trebling the size of investment in the processed food sector by increasing the level of processing of perishables from 6 per cent to 20 per cent, value addition from 20 per cent to 35 per cent and share in global food trade from 1.5 per cent to 3 per cent by 2015. According to the Ministry, an investment of Rs. 100,000 crore (US$ 16 billion) would be required in 2015 to achieve these targets.

Some of the major initiatives taken by the Government of India to improve the food processing sector in India are as follows:

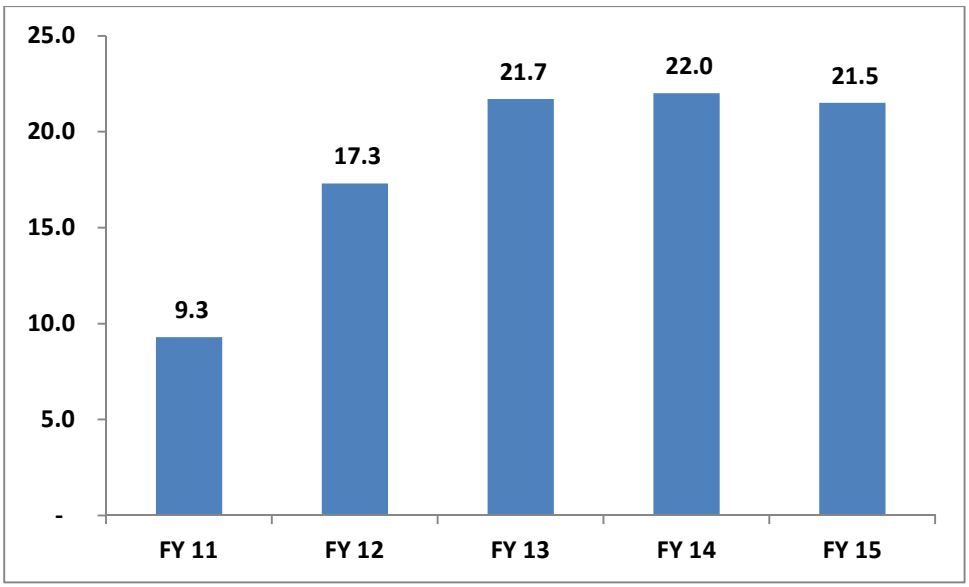
- Ms Harsimrat Kaur Badal, Union Minister for Food Processing Industries, Government of India inaugurated the first of its kind Rs 136 crore (US$ 20.49 million) mega international food park at Dabwala Kalan, Punjab.
- The Ministry of Food Processing Industries announced a scheme for human resource development (HRD) in the food processing sector. The HRD scheme is being implemented through State Governments under the National Mission on Food Processing. The scheme has the following four components:
  - Creation of infrastructure facilities for degree/diploma courses in food processing sector
  - Entrepreneurship Development Programme (EDP)
  - Food Processing Training Centres (FPTC)
  - Training at recognised institutions at State/National level
- The Food Safety and Standards Authority of India (FSSAI) under the Ministry of Health and Family Welfare has issued the Food Safety and Standards (Food Product Standards and Food Additives) Regulations, 2011 and the Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011 which prescribe the quality and safety standards, respectively for food products.
- The Ministry of Food Processing Industries has taken some new initiatives to develop the food processing sector which will also help to enhance the incomes of farmers and export of agro and processed foods among others.
- The Government of India has approved the setting up of five numbers of Mega Food Parks in the states of Bihar, Maharashtra, Himachal Pradesh and Chhattisgarh. The Government plans to set up 42 such mega food parks across the country in next three to four years.

- In the Budget 2015-16, a corpus of Rs. 2,000 crore (US$ 301.27 million) was created under National Bank for Agriculture and Rural Development (NABARD) to provide cheaper credit to food processing industry. Excise duty on plant and machinery for packaging and processing has been brought down to six per cent from 10 per cent.
- The Government of India has planned to set up 42 mega food parks across the country in next three to four years.

Shinoj and Mathur (2008) in their study have ascertained the changes in comparative advantage status of India's major agricultural exports vis-a-vis other Asian players during the post-reforms period (1991-2004). It has been found that in exports of certain commodities like cashew and oil meals, India has been able to maintain its comparative advantage, but several others like tea, coffee, spices, marine products, etc. have been negatively affected. India has been found losing out its comparative advantage in export of some of the agricultural commodities to other Asian competitors during the period after economic reforms.

The potential of a country to avail opportunities depends upon factors like exportable surplus left after meeting the domestic demand, relative domestic prices to the international export prices, domestic export promotion policies, nature of import, trade barriers in the international market, domestic infrastructure and procedural bottle necks .

Table 2.3 (Exports in US $ Billion)




Source: Agricultural & Processed Food Products Exports Development Authority (APEDA)

Though at macro level, the exports of agricultural and processed food products are increasing at a faster pace, it needs to be studied at the ground level whether the farmer is getting benefitted in realizing remunerative prices for his produce whenever exports are happening for that produce.

## 2.14 Situation survey of the Agricultural Households

Situation Assessment Survey of Agricultural Households is being conducted by National Sample Survey Office (NSSO) under the Ministry of Agriculture, Government of India (GOI). The survey collects pan India data about the socio economic condition of the agricultural households. The last survey-70TH round of survey was conducted between January-December 2014. The survey is all about various socio economic conditions only.

The survey collects information about the social conditions like numbers of households, their social groups like Scheduled castes or tribes or

backward or others, the family incomes both from farm and non-farm businesses, and consumption expenditures, indebtedness, types of ration cards they are holding, their position above or below poverty line, farming practices and preferences, resource availabilities, information on crop loss and crop insurance, awareness of minimum support price. It is about economic wellbeing of the agricultural households. However, this study focuses primarily on managing value chain at farmer level while raising his crop and getting support from other agencies. Thus these two are very different studies.

## 2.15 Summary

Farmer, who occupies the prime position in Indian Agriculture, performs various farm tasks and activities in raising the crop. How he manages his farm activities can be likened to the "value Chain" concept of Michael Porter. The chapter began with definition of value chain propounded by Michael Porter and its relevance in agriculture. Different authors talked about the various aspects of the value chain including in the area of agriculture. The chapter goes on to explain the Indian agriculture growth strategy from various sources including secondary data. The importance of inputs in agriculture was amply brought out by authors like Shoji Lal Bairwa et al, Venkatesh,Venugopal and many others. The working group of planning commission went into depth of the demand and supply of inputs. Agriculture infrastructure and its importance were brought out by authors like Venkatachalam, Biswanger et. al. Rakesh Mohan and others. Agricultural Machinery factor was dealt by the sub-group on Agricultural Implements and Machinery for formulation of 9th Five Year Plan. ICRISAT`s experience of Technology Development and Transfer is an eye opener as how to go about developing technology with the participation from and collaboration with the farmers. Various government extension programmes including KVKs, were enumerated to educate the farmers at ground level from time to time. Agricultural Credit and its reach and forms

were adequately explained by Rakesh Mohan and others. Agricultural Insurance and its evolution got adequate coverage in the chapter. Various intricate aspects of information and market intelligence with respect to agricultural marketing were elaborately covered by Vadivelu & Kiran, Subrahmanyam & Mrutunjaya, Rahman and others. The working group of Planning Commission of the 12th Five Year plan went extensively into the agricultural marketing issues and concerns. Agri-Food processing and agri-exports were discussed from the secondary data and the need to study how they benefit the farmer at ground level. Thus the activities that add value at the farmer level and those activities which support the farmer for effectively managing the value chain are studied in the review of the literature.

# CHAPTER III
# GROWTH OF INDIAN AGRICULTURE DURING THE PAST FIFTY YEARS

## 3.0 Introduction

Pandit Jawahar Lal Nehru, India's first prime minister once said "Everything can wait, but not agriculture". He gave tremendous importance to agriculture. Under his guidance Planning Commission gave significant importance to the growth of agriculture in India. Planning Commission had made plans and budget allocations to agriculture over the fifty year period. The Central government, the State Governments, the Research Organizations, State Agricultural Universities coherently and achieved great heights in increasing the agricultural production as well as yields per hectare. The Indian farmer played his part in supporting the tremendous efforts of all these agencies listed and achieved excellent yields.

## 3.1 Growth in Agricultural Production in India

Growth of Indian Agriculture has been quite impressive since 1950-51. The food grain production increased many fold in the past over fifty years. So much so, even the non-food crops production has increased.

### 3.1.1 Food grains

At the time of independence, India was importing food grains to meet the domestic needs. During 1966 India imported 10 million tonnes of food grains and in the very next year 12 million tonnes were imported. During Green Revolution period and thereafter, the food grains production increased substantially from 82 million tonnes in 1960-61 to about 265 million tonnes during 2013-14, an increase of 223%. The food grain production details are given in the Table 3.1.

Table 3.1 (All India Production of Food Grains)

| Year | All India Production of food grains (million tonnes) | Combined Andhra Pradesh |
|---|---|---|
| 1950-51 | 50.82 | N.A. |
| 1960-61 | 82.02 | 6.42 |
| 1970-71 | 108.42 | 7.41 |
| 1980-81 | 129.59 | 9.99 |
| 1990-91 | 176.39 | 12.33 |
| 2000-01 | 196.81 | 16.03 |
| 2010-11 | 244.49 | 21.05 |
| 2013-14* | 264.77 | 22.40 |

* Estimates

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf and Agriculture at a glance 2014, Bureau of Economics and Statistics, Governments of Andhra Pradesh and Telangana)

The production of food grains in combined Andhra Pradesh which was 6.42 million tonnes during 1960-61 increased to 22.40 million tonnes during 2013-14, an increase of 249%.

### 3.1.2 Commercial crops

The production of commercial crops also had increased substantially for the past over fifty years. They are given in the table below. As far as cotton is concerned the production has increased substantially from 9.52 million bales in 2000-01 to 36.59 million bales in 2013-14, an increase of 284%, mainly due to the Genetically Modified BT cotton introduction. Sugar cane production increased from 110 million tonnes in 1960-61 to 350 million tonnes in 2013-14, an increase of 218%. The tobacco production increased from 0.31 million tonnes in 1960-61 to 0.66 million tonnes in 2013-14, an increase of 113%.

Table 3.2 (All India Production of Commercial Crops)

| Year | Cotton (million bales#) | Sugarcane (million tonnes) | Tobacco (million tonnes) |
|---|---|---|---|
| 1950-51 | 3.04 | 57.05 | 0.26 |
| 1960-61 | 5.60 | 110.0 | 0.31 |
| 1970-71 | 4.76 | 126.37 | 0.36 |
| 1980-81 | 7.01 | 154.25 | 0.48 |
| 1990-91 | 9.84 | 241.05 | 0.56 |
| 2000-01 | 9.52 | 295.96 | 0.34 |
| 2010-11 | 33.0 | 342.38 | 0.88 |
| 2013-14* | 36.59 | 350.02 | 0.66 |

# Each bale is 170 kg; * Estimates

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

### 3.1.3 Horticultural crops

In the case of horticultural crops also the production went up significantly. In respect of the production of fruits, which was 71,516,000 tonnes in 2009-10 went up to 86,822,000 tonnes in 2013-14 (estimate). The vegetable production went up from 134,102,000 tonnes in 2009-10 to 168,142,000 tonnes in 2013-14 (estimate). The production of plantation crops went up from 11,928,200 tonnes in 2009-10 to 16,598,000 tonnes in 2013-14 (estimate). The production of spices went up from 223,155,200 tons in 2009-10 to 280,792,000 tonnes in 2013-14.

Table 3.3 (All India production of Horticultural crops in 000's of tonnes)

| Year | Fruits | Vegetables | Plantation | Spices |
|---|---|---|---|---|
| 2009-10 | 71,516 | 134,102 | 11,928 | 223,155 |
| 2013-14(P) | 86,822 | 168,142 | 16,598 | 280,792 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

(P) =provisional

## 3.2 Yields comparison with other countries:

Though it looks impressive to observe the growth of agricultural produce on a standalone basis, it is necessary to compare the yields with other countries to see where India stands in comparison.

Table 3.4 (Yields of Paddy crop in various countries during 2012)

| Country | Yield in Kg/Hectare |
|---|---|
| World | 4,548 |
| India | 3,721 |
| China | 6,775 |
| USA | 8,349 |
| Indonesia | 5,136 |
| Bangladesh | 4,421 |
| Japan | 6,739 |
| Korea | 6,988 |
| Egypt | 9,530 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

It is evident from the table above that India`s yield of Paddy per hectare is very low 3,721 kg/hectare even compared to countries like Bangladesh 4421 kg/hectare. Yield in USA 8349 kg/hectare is more than double of India. India needs to do a lot to improve the yields.

Table 3.5 (Yields of Wheat crop in various countries in during 2012)

| Country | Yield in Kg/Hectare |
|---|---|
| World | 3,090 |
| India | 3,177 |
| China | 4,987 |
| USA | 3,115 |
| France | 7,599 |
| Bangladesh | 2,779 |
| UK | 6,657 |
| Germany | 7,328 |
| Egypt | 6,582 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

Though the Indian yield of 3,177 kg/hectare is marginally above the world average of 3,090 kg/ hectare, India like in Paddy has to cover a lot of ground to improve the yield of wheat as well.

Table 3.6 (Yields of Sugarcane crop in various countries during 2012)

| Country | Yield in Kg/Hectare |
|---|---|
| World | 70,599 |
| India | 70,931 |
| China | 68,806 |
| USA | 80,057 |
| Indonesia | 70,000 |
| Bangladesh | 42,770 |
| Thailand | 76,750 |
| Australia | 76,654 |
| Egypt | 115,329 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

With respect to Sugarcane crop, the yields in India appear to be on par with the world, though we need to learn a lot from a small country like Egypt as to how they are producing 115,329 kg/hectare.

Table 3.7 (Yields of Tobacco crop in various countries during 2012)

| Country | Yield in Kg/Hectare |
|---|---|
| World | 1,746 |
| India | 1,768 |
| China | 2,162 |
| USA | 2,542 |
| Indonesia | 908 |
| Bangladesh | 1,678 |
| Japan | 2,189 |

| Country | Yield in Kg/Hectare |
|---|---|
| France | 2,511 |
| Pakistan | 2,130 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

In tobacco yields, India (1,768 kg/hectare) is at par with the world average yields (1,746 kg/hectare), though China (2,162 kg/ ha), France (2,511 kg/ hectare) and Japan (2,189 kg/ hectare) are ahead of India.

The above comparison of yields of various crops shows that India falls behind in yields, compared to certain other countries.

### 3.3 Growth of agriculture from the culled out variables perspective

Having studied the growth of Indian agriculture at macro level, it is necessary to study the growth from the perspective of the variables culled out from the review of literature. The variables are:

- Agricultural inputs supply
- Agricultural infrastructure
- Farm mechanization
- Agricultural credit
- Agricultural insurance
- Agricultural technology development
- Agricultural marketing
- Extension
- Information and communication technology (ICT)

Agriculture in India is a concurrent subject. Both Central Government and State Governments strive to monitor and support agriculture development. Though there are some over lapping programmes, by and large some

aspects are specific to Central government and some to State Governments.

Data for all the variables for combined Andhra Pradesh over the past fifty years is not available from the secondary sources. The available data for combined Andhra Pradesh (the state of the study) is incorporated in this chapter. The Government policies and programmes were mentioned separately in the paragraphs allocated for each variable.

### 3.3.1 Agricultural inputs supply

The primary agricultural inputs that the farmer uses in his farm are seeds, fertilizers and pesticides.

#### 3.3.1.1 Seeds

The farmer sources his seeds either from the private input dealers or government agencies like cooperative societies. Whatever is the source of the seeds that the farmer procures from, they are within the preview of the Seed Act made by the Government of India. Government of India enacted "Seed Act, 1966" (Act No. 54 of 1966). Vide the seed act, a central seed committee was formed. The central and state seed laboratories were established. The government has the power to specify the minimum limits of germination and purity. The seed certification agencies were founded. The entire seed input supply chain has to work within the seed act, 1966. The same was amended in 1972. Vide the amendment the Central Seed Certification Board was established. The seed production goes through various stages of production. The seed companies will have their own germplasm of each variety that they produce and market. They will get the foundation seed produced from their breeder seed under their own supervision in select farms. Later the same is given to seed farmers and the seed is produced again under their own supervision and market it to the farmers. The all India seed production for the last 15 years is given in the

table below. The breeder seed which was 42,690 quintals in 2000-01 has gone up to a maximum of 123,380 quintals in 2011-12 and is hovering around it for the past two years. The certified seed that was distributed increased from 8.627 million quintals in 2000-01 to 30.139 million quintals, an increase of 249% in just about a decade and a half.

Table 3.8 (All India production and distribution of seeds)

| Year | Production of Breeder seeds (000's of Quintals) | Production of foundation seeds (Lakhs of quintals) | Distribution of Certified/Quality Seeds(Lakhs of quintals) |
|---|---|---|---|
| 2000-01 | 42.69 | 5.91 | 86.27 |
| 2001-02 | 45.54 | 5.44 | 91.80 |
| 2002-03 | 48.42 | 6.14 | 98.03 |
| 2003-04 | 61.82 | 6.50 | 108.59 |
| 2004-05 | 66.46 | 6.90 | 120.26 |
| 2005-06 | 68.64 | 7.40 | 126.75 |
| 2006-07 | 73.83 | 7.96 | 155.01 |
| 2007-08 | 91.96 | 8.22 | 179.05 |
| 2008-09 | 94.41 | 9.69 | 215.81 |
| 2009-10 | 102.00 | 10.50 | 257.11 |
| 2010-11 | 118.85 | 17.53 | 277.34 |
| 2011-12 | 123.38 | 21.86 | 294.85 |
| 2012-13 | 110.20 | 16.17 | 313.44 |
| 2013-14(P) | 82.29 | 17.43 | 301.39 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

(P) =provisional

### 3.3.1.2 Fertilizers

Fertilizers are an important input in the production of the crops which are produced in the high investment projects in public sector and private sector. Whenever there is a shortage of fertilizers in the domestic market, they are imported to meet the demand. In the late sixties the Government of India announced the 'New Agricultural Policy" in 1966-67 and put in major efforts in improving the yields of crops especially the food grains. High Yielding varieties were introduced which needed high doses of fertilizers. To meet the high demand for fertilizers under the New Agricultural Strategy, the fertilizer production was increased, imports were made and thus the fertilizer consumption increased. Fertilizer (Nitrogen, Phosphorous and Potash) consumption in the country for the past sixty years is given in the table below. The table below clearly states that the fertilizer consumption in India suddenly jumped from 292,100 tonnes in 1960-61 to 2,177,000 tonnes in 1970-71. This jump was purely due to the responsive high yielding varieties which increased the yield significantly. The fertilizer consumption kept increasing and reached a peak of 28,122,200 tonnes in 2010-11 and slightly declined to 24,482,400 tonnes in 2013-14. Fertilizer production (production) and supply (including imports) is another major contributor to the agricultural production in India.

Table 3.9 (All India Fertilizer consumption - N, P, K )

| Year | Fertilizer Consumption (N, P, K) (000's of tonnes) |
|---|---|
| 1950-51 | 65.60 |
| 1960-61 | 292.10 |
| 1970-71 | 2,177.00 |
| 1980-81 | 5,515.60 |
| 1990-91 | 12,546.20 |
| 2000-01 | 16,702.30 |
| 2010-11 | 28,122.20 |
| 2013-14 | 24,482.40 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)
Note: Figures up to 1982-83 relate to February to January and for later years April to March)

Government of India provides subsidy on certain fertilizers, especially on nitrogen fertilizers. Some of the subsidies are offered at manufacturer level and some at farmer level. The policy of subsidies on fertilizers is being reviewed by the Government of India from time to time.

#### 3.3.1.3 Pesticides

Pests normally infest the crops raised by the farmers. These pests vary from crop to crop both in variety and in intensity. The pesticide is a general term covering the insecticides which kill the insects which damage the crops and also fungicides which control the pathological diseases. Farmer sprays pesticides to save the crop from damage and thus consumes good amount of pesticides and incur cost as part of production. The pesticide industry is dominated by the private sector, although there are some public sector organizations involved in manufacturing and distributing them to the farmers through various input channels. Pesticide manufacturing companies produce technical grade material and make formulations by themselves or sell the technical grade material to other manufacturers in the industry to in turn make formulations and market the same. The details of the technical grade material, consumed in all India for the past 15 years, are available which are given below. It is observed that the technical grade material consumed increased from 43,580 tonnes during 2000-01 to 58,210 tonnes during 2013-14 (Provisional).

Table 3.10 (All India Pesticide Consumption Technical Grade material)

| Year | Consumption of pesticide (Technical grade material) In 000's of tonnes |
|---|---|
| 2000-01 | 43.58 |
| 2001-02 | 47.02 |
| 2002-03 | 48.30 |
| 2003-04 | 41.00 |
| 2004-05 | 40.67 |
| 2005-06 | 39.77 |
| 2006-07 | 41.51 |
| 2007-08 | 43.63 |
| 2008-09 | 43.86 |
| 2009-10 | 41.82 |
| 2010-11 | 55.54 |
| 2011-12 | 52.98 |
| 2012-13 | 45.62 |
| 2013-14(P) | 58.21 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

(P) = Provisional

### 3.3.1 Agricultural Infrastructure

The basic agricultural infrastructure includes power, irrigation and rural road connectivity.

### 3.3.2.1 Power

The basic infrastructure like power is provided by the government. Farmer uses power to irrigate his land. Some states like combined Andhra Pradesh had gone to an extent of providing free power to the farmers for agricultural purposes. Usage of power for agriculture in India has increased many-fold in the past thirty years. The consumption of power in the last sixty years is given in the table below. The consumption of electricity figures for agricultural purpose are available from 1982-83 onwards. That is for the past thirty years. The consumption shows that it has gone up from 17,817 GWh to 140,960 GWh, a tremendous increase of 690% in just thirty years. Consumption of electricity for agriculture did contribute to the agricultural growth in India for sure.

Table 3.11 (Power consumption in India for agricultural purpose)

| Year | Consumption for agricultural purposes (in GWh) |
|---|---|
| 1982-83 | 17,817 |
| 1990-91 | 50,321 |
| 2000-01 | 84,729 |
| 2010-11 | 126,377 |
| 2011-12 | 140,960 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf - Central Electricity Authority, New Delhi)

Table 3.12 (Power consumption in agricultural sector in combined Andhra Pradesh in Mega Watt)

| Year | Power consumption In agriculture in combined AP in Mega watts |
|---|---|
| 1961 | 17 |
| 1971 | 104 |
| 1981 | 236 |
| 1991 | 1,338 |
| 2001 | 2,913 |
| 2006 | 2,754 |

(Source: Five decades of Agricultural Statistics, by Directorate of Economics and Statistics, AP 1950-51 to 2005-2006)

The agriculture sector in Andhra Pradesh was only consuming 17 Mega Watts of power in 1961 which went up to 2754 Mega Watts in 2006, a substantial increase of 16,100%. Power consumption in agriculture sector is an indication of growth in agriculture.

#### 3.3.2.2 Irrigation

Irrigation is another very important input for agriculture. The water for irrigation is sourced from various avenues like canal water, tank water, bore wells and a combination of them. The water thus sourced may be used directly by the farmer or he may use the water judiciously (in case of shortage of it) through either sprinklers or drip irrigation. Generally, more is the irrigated area, more are the yields and production. Over the last sixty years successive governments made huge investments to provide irrigation to agriculture. Major irrigation efforts were made around 1966 -67 when the Government of India announce the 'New Agricultural Strategy" which was later to be called Green Revolution. With respect to the gross irrigated area, there was an increase from 22.56 million hectares in 1950-51 to 91.53 million hectares in 2011-12 (P), an increase of 306%. Similarly, the net irrigated area increased from 20.85 million hectares in 1950-51 to 65.26 million hectares in 2011-12., an increase of 213%. The area irrigated more than once increased from 1.71 million hectares in 1950-51 to 26.27 million hectares in 2011-12 (P), an increase of 1,436%. The analysis of irrigated area clearly established that the irrigation to significant amount of dry land area was provided by the government of India as part of the new agricultural strategy launched in 1966-67 which was later called green revolution and it was one of the main contributors to the tremendous increase in yields. The yield of food grains increased from 522 kg per hectare in 195-51 to 2101 kg per hectare in 2011-12, an increase of 302% in about sixty years. The yield per hectare and the gross irrigated area went hand in hand with about 300% growth each, which is a commendable performance of agricultural sector. After the HYV (High Yielding

Varieties), it is the irrigation which played a very significant contribution to the growth of Indian Agriculture. The area which was irrigated year wise in the last sixty years is given in the table below.

Table 3.13 (Area under Irrigation in India)

| Year | Net Irrigated Area in million hectares | Gross Irrigated Area in million hectares | Area Irrigated More than Once in million hectares |
|---|---|---|---|
| (1) | (2) | (3) | (3-2) |
| 1950-51 | 20.85 | 22.56 | 1.71 |
| 1960-61 | 24.66 | 27.98 | 3.32 |
| 1970-71 | 31.10 | 38.20 | 7.09 |
| 1980-81 | 38.72 | 49.78 | 11.06 |
| 1990-91 | 48.02 | 63.20 | 15.18 |
| 2000-01 | 55.20 | 76.19 | 20.98 |
| 2010-11(P) | 63.60 | 88.63 | 25.03 |
| 2011-12(P) | 65.26 | 91.53 | 26.27 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

(P) = Provisional

Area under irrigation in combined Andhra Pradesh in the last fifty years:

The net irrigated area in combined Andhra Pradesh in1956-57 was 2.86 million hectares which went up to 5.30 million hectares in 2013-14, an increase of 85% in about forty seven years.

The gross irrigated area was 3.39 million hectares in 1956-57 which went up to 7.26 million hectares in 2013-14, an increase of 114% in about forty seven years.

The area that is irrigated more than once has gone up from 0.53 million hectares in 1956-57 to 1.96 million hectares in 2013-14, an increase of 270%.

Table 3.14 (Irrigation in combined Andhra Pradesh)

| Year | Net Irrigated Area in Million hectares | Gross Irrigated Area in Million hectares | Area Irrigated More than Once in Million hectares |
|---|---|---|---|
| (1) | (2) | (3) | (3-2) |
| 1956-57 | 2.86 | 3.39 | 0.53 |
| 1960-61 | 2.91 | 3.47 | 0.56 |
| 1970-71 | 3.31 | 4.22 | 0.91 |
| 1980-81 | 3.46 | 4.34 | 0.88 |
| 1990-91 | 4.30 | 5.37 | 1.07 |
| 2000-01 | 4.53 | 5.92 | 1.39 |
| 2010-11 | 5.03 | 7.14 | 2.11 |
| 2013-14 | 5.30 | 7.26 | 1.96 |

(Source: Agriculture at a glance 2014, Bureau of Economics and Statistics, Government of Andhra Pradesh & Agriculture at a glance 2014, Bureau of Economics and Statistics, Governments of Telangana)

### 3.3.3 Farm mechanization in India

Mechanization in agriculture uses technology and farm equipment to perform various tasks in the field ranging from seed bed preparation, sowing/planting, fertilizer application, irrigation, harvesting and post harvesting. It is observed that the maximum mechanization is undertaken while preparing the seed bed (penetration levels at 40%) and irrigation (penetration levels at 45%) while the total mechanization rate is 40-45%. Farm mechanisation i.e. usage of technology and equipment in performing various tasks in the agricultural field has wide scope. It entails major agricultural tasks like seedbed preparation, wing/planting, fertilizer application, irrigation and harvesting, among others. The important machinery used in agriculture includes tractors, threshers and power tillers, Combine Harvesters etc. The annual sale of tractors is about 600,000, threshers 100,000, power tillers 56,000 and combine harvesters 4000 (source: trends of agricultural Mechanization in India CSAM Policy Brief, June, 2014). Tractor market is the largest by far with about Rs.34,000 crores ( 6,00,000 units annually).

Farm power:

Farm power, apart from mechanized equipment includes agricultural labour, drought animal power. Farm power available in India over the forty odd fifty years is given in the table below. Of the total farm power of 1.841 Kw/Hectare, mechanized equipment constitutes 1.653 Kw/Hectare which is 90%. Tractors provide the largest farm power of 0.844 which is almost 50% of the total farm power.

Table 3.15 (Farm power available in Indian Agriculture - in Kw/Hectare)

| Year | Agri workers | Drought Animals | Tractors | Power Tillers | Diesel Engines | Electric Motors | Total Power |
|---|---|---|---|---|---|---|---|
| 1971-72 | 0.045 | 0.133 | 0.020 | 0.001 | 0.053 | 0.041 | 0.293 |
| 1975-76 | 0.048 | 0.135 | 0.040 | 0.001 | 0.078 | 0.056 | 0.358 |
| 1981-82 | 0.051 | 0.128 | 0.090 | 0.002 | 0.112 | 0.084 | 0.467 |
| 1985-86 | 0.057 | 0.129 | 0.140 | 0.002 | 0.139 | 0.111 | 0.578 |
| 1991-92 | 0.065 | 0.126 | 0.230 | 0.003 | 0.177 | 0.159 | 0.760 |
| 1995-96 | 0.071 | 0.124 | 0.320 | 0.004 | 0.203 | 0.196 | 0.918 |
| 2001-02 | 0.079 | 0.122 | 0.480 | 0.006 | 0.238 | 0.250 | 1.175 |
| 2005-06 | 0.087 | 0.120 | 0.700 | 0.009 | 0.273 | 0.311 | 1.500 |
| 2011-12 | 0.100 | 0.119 | 0.804 | 0.014 | 0.295 | 0.366 | 1.698 |
| 2012-13 | 0.093 | 0.094 | 0.844 | 0.015 | 0.300 | 0.494 | 1.841 |

(Source: Trends in Agricultural Mechanization India CSAM Policy Brief, June 2014-ICICI Research Paper)

Government of India provides subsidy on farm equipment. Especially, irrigation equipment like sprinkler irrigation equipment and drip irrigation equipment get good amount of subsidy from the Government of India. Subsidy also is provided on certain other farm equipment like power tillers also. The policy of subsidy on farm equipment is being reviewed by the Government of India from time to time.

As the agricultural labour is becoming less adequate due to migration to cities and expensive, the way forward is mechanization. Increasing mechanization leads to higher productivity as well.

### 3.3.4 Agricultural credit

Farmer takes loans (either short term or long term) to meet the production costs from various sources. The sources include the cooperative credit societies or Regional Rural Banks (RRBs) or Nationalised Banks and also the private money lenders. Governments also make special allocation of funds to meet the requirement of farm credits through various channels like Nationalized Banks, NABARD (National Bank for Agriculture and Rural Development) etc. These public sector finance institutions are even given targets to meet the finance requirements of agriculture sector. The flow of institutional credit to agricultural sector (at all India level) from cooperative banks increased from Rs. 18,620 crores in 1999-2000 to Rs. 1,19,963 crores in 2013-14, an increase of 544% in just 14 years. The flow of credit from Regional Rural Banks increased from Rs. 3,172 crores in 1999-2000 to Rs. 82,653 crores in 2013-14, an increase of 2,505% during the same period. The flow of credit from Commercial Banks increased from Rs. 24,733 in 1999-2000 crores to Rs. 509,005 crores in 2013-14 , an increase of 1,958% in just 14 years. The total flow of institutional credit flow (short term, medium term and long term put together) increased from Rs. 46,268 crores in 1999- 2000 to Rs. 711,621 crores, a tremendous increase of 1,438%. Such a large and conscious flow of institutional credit to agricultural sector did contribute to the growth of agriculture in India. The flow of institutional credit in India over the past fifteen years is given below.

Table 3.16 (Flow of institutional credit in India - Rupees in Crores)

| Year | Coopera-tive Banks | Regional Rural Banks | Commer-cial Banks | Other Agencies | Total |
|---|---|---|---|---|---|
| 1999-00 | 18,260 | 3,172 | 24,733 | 103 | 46,268 |
| 2000-01 | 20,718 | 4,219 | 27,807 | 83 | 52,827 |
| 2001-02 | 23,524 | 4,854 | 33,587 | 80 | 62,045 |
| 2002-03 | 23,636 | 6,070 | 39,774 | 80 | 69,560 |
| 2003-04 | 26,875 | 7,581 | 52,441 | 84 | 86,981 |

| | | | | | |
|---|---|---|---|---|---|
| 2004-05 | 31,231 | 12,404 | 81,481 | 193 | 125,309 |
| 2005-06 | 39,404 | 15,223 | 125,477 | 382 | 180,486 |
| 2006-07 | 42,480 | 20,435 | 166,485 | 0 | 229,400 |
| 2007-08 | 48,258 | 25,312 | 181,088 | 0 | 254,658 |
| 2008-09 | 45,966 | 26,765 | 228,951 | 226 | 301,908 |
| 2009-10 | 63,497 | 35,217 | 285,800 | 0 | 384,514 |
| 2010-11 | 70,105 | 43,968 | 332,706 | 0 | 446,779 |
| 2011-12 | 87,963 | 54,450 | 368,616 | 0 | 511,029 |
| 2012-13 | 111,203 | 63,681 | 432,491 | 0 | 607,375 |
| 2013-14 | 119,963 | 82,653 | 509,005 | 0 | 711,621 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

### 3.3.5 Agricultural Insurance

Insurance in agriculture is a risk mitigating mechanism for the farmers to cover his crop losses if any, from any unforeseen calamities. The agriculture insurance sector is primarily being administered by the public sector under takings. As the agriculture sector was making progress, the agricultural insurance sector also undergoing several changes. The agricultural insurance is being undertaken by Agriculture insurance Company of India Limited. Comprehensive Crop Insurance Scheme (CCIS) was covered 15 states and 2 Union Territories. The scheme was voluntary for the farmers and there were lot of lacunae and hence had to be scrapped in 1997. Then Experimental Crop insurance was introduced in 1997-98 for the non-loanees and it was discontinued the same year. The needs of the current agriculture insurance are met through NAIS (National Agriculture insurance Scheme) which was launched in 1999-2000. Under the scheme certain crops are notified and such notified crops are insured by Agriculture Insurance Company of India Limited. When the farmer avails crop loan from formal financial institutions like Cooperative Credit Societies or Regional Rural Banks or Nationalized Commercial Banks, the premium for the insurance is mandatorily deducted by the lending institution. The premium is shared partly by the State Government and also

the Central Government. In the last 25 years ie from 1999-2000 up until 2014 Kharif ( cumulative ) , 5,91,56,657 farmers got benefited out of the 228,872,591 farmers covered under the National Agriculture Insurance Scheme. In total Rs. 347,905 crores were the sum insured and the claims reported were for Rs. 32,885 crores. The claims paid were for Rs. 32,542 crores.

Table 3.17 (National Agricultural Insurance Scheme - NAIS cumulative)

| S. no. | Item | All India | Combined Andhra Pradesh |
|---|---|---|---|
| 1 | No. of farmers covered | 228,872,591 | 29,954,648 |
| 2 | Area insured in hectares | 339,103,432 | 45,586,156 |
| 3 | Sum insured (Rs.Crores) | 347,905 | 62,192 |
| 4 | Farmers` premium (Rs. Crores) | 9,187 | 1,611 |
| 5 | State Government premium (Share) (Rs. Crores) | 979 | 78 |
| 6 | GOI Premium (Rs. Crores) | 391 | 78 |
| 7 | Gross premium (Rs. Crores) | 1,055,758 | 1,768 |
| 8 | Claims reported (Rs. Crores) | 32,885 | 4,649 |
| 9 | Claims paid (Rs. Crores) | 32542 | 4,647 |
| 10 | No. of farmers benefited | 59,156,657 | 6,730,052 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

Since the insurance scheme NAIS was launched in 1999-200, till 2014 Kharif cumulatively in combined Andhra Pradesh 29,954,648 farmers were covered under the scheme and 6,730,052 farmers got benefited from it. Gross premium paid the farmers was Rs. 1,768 crores. Claims reported was for Rs. 4,649 crores and claims paid was for Rs.4,647 crores. An area of 45,586,156 hectares was covered under the NAIS.

### 3.3.6 Agricultural Technology Development

#### 3.3.6.1 Green revolution

In India the major technological breakthrough had come in through the Green Revolution. Government of India had announced the 'New Agricultural Policy" in 1966-67 to improve the yields in agriculture which was later turned out to be green revolution with a purpose of increasing production and minimizing agricultural import of food grains. Introduction of HYV (High Yielding Varieties) was the core of the strategy. The HYV s needed adequate water supply through additional irrigational facilities, increased doses of fertilizers, and adoption of improved plant protection measures. The results achieved through Green Revolution were very encouraging increasing in the yields of food grains especially rice and wheat.

The yields of food grains per hectare from 1950-51 to 2013-14 are enlisted in the table below. The yield of food grains per hectare doubled from 522 kg per hectare in 1950-51 to 1023 kg per hectare in 1980-81, by which time the benefits of green revolution were received. The benefits of the increased yield of food grains continued with the use of high yielding varieties, increased use of fertilizers and improved irrigation facilities and reached a level of 2101 kg per hectare. Such a growth in yield and the consequent production could be squarely attributed to the conception and implementation of the new agricultural strategy around 1966-67. Green revolution is also a major reason for reducing the import of food grains to nil.

Table 3.18 (Yield of Food Grains in India)

| Year | Yield of food grains In kg per hectare |
|---|---|
| 1950-51 | 522 |
| 1960-61 | 710 |
| 1970-71 | 872 |

| | |
|---|---|
| 1980-81 | 1023 |
| 1990-91 | 1380 |
| 2000-01 | 1626 |
| 2010-11 | 1930 |
| 2013-14* | 2101 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

* Estimates

### 3.3.6.2 Genetically Modified (GM) Crops

The next big development of technology in agriculture in India is the Genetically Modified Crop. It is generally called GM crop. The genetically modified crop was introduced in India in Cotton in during 2000-01. It is called BT cotton. For years cotton crop used to get infested by boll worm, which damages the boll, thereby reducing the yields substantially. It was quite expensive to apply plant protection chemicals and it was financial burden to the farmers. The introduction of BT cotton (in the GM category) helped control the boll worm pest. The BT cotton variety is resistant to the boll worm pest, and thereby increasing the yields. After introduction of BT cotton in 2000-01 the yields increased substantially as given in the table below. It is clear that the yields per hectare of cotton increased from 190 kg per hectare in 2000-01 to 532 kg per hectare, an increase of 180% in just a decade. The increase in yields is purely due to the technology development and transfer of genetically modified crop (BT cotton).

Table 3.19 (Yield of cotton in India)

| Year | Yield of cotton in Kg per hectare |
|---|---|
| 1950-51 | 88 |
| 1960-61 | 125 |
| 1970-71 | 106 |
| 1980-81 | 152 |
| 1990-91 | 225 |
| 2000-01 | 190 |
| 2010-11 | 499 |
| 2013-14 (P) | 532 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

### 3.3.6 Agricultural Marketing:

State government provides the needed support by the farmers to market the agricultural produce at as remunerative prices as possible. It also procures some of the produce especially the food grains to meet its social welfare schemes. To achieve this stated objective, the state government establishes the market yards with governing bodies elected by the local people. All these activities of marketing are undertaken by the department of marketing.

In combined Andhra Pradesh, the department of agricultural marketing was separated in 1962 from department of agriculture with the purpose of regulating the marketing of agricultural produce to help farmers in accordance with the agricultural produce act and other schemes of the department. The commissioner Director is the head of the department. Each district is headed by an Assistant Director of marketing functioning as a District officer with regional directors and Deputy Directors of marketing in the state. All the field officers supervise and monitor the enforcement and implementation of the provisions of the A.P. (Agricultural Produce and Live Stock) Markets Act 1966.

### 3.3.6.1 Growth and historical back ground of the A.P. Markets Act.

Legislation on agricultural marketing has come into the state on the recommendations of the Royal Commission on Agriculture of 1928. The Nizam Government enacted the Hyderabad Agricultural Produce and Live Stock markets Act in 1930 and was to enforce in Telangana area of the state. The Madras Commercial crops Act of 1933 was in force in other parts of the state. These two market legislations were in force till 1966. A comprehensive markets Act has come into force from 18-11-1966 in the state of combined Andhra Pradesh called the A.P. (Agricultural Produce and Livestock) markets Act, 1966.

There are 299 agricultural market committees and 889 markets were notified. Out of them 381 markets are developed and the rest are yet to be developed. These market committees supervise the developed market yards which take up marketing of agricultural produce. Some of the schemes implemented by the market committees are as follows.

i) **Rythu Bandhu Pathakam (Pledge Loan Scheme)**: Under this scheme, the farmer can store his produce with the market yard and get a pledge loan up to 75% of the value of the produce or a maximum of Rs. 50,000 per farmer, without interest up to 90 days and there after simple interest is charged. Wherever the market yards have no warehouse space, the produce can be stored in a central or state ware house and produce the receipt and get the pledge loan.

ii) **Sale of Inputs**: Inputs like seeds, fertilizers, and pesticides are sold by the market yards to the farmers on no-loss-no-profit basis.

iii) **Cold storage units**: Under this scheme subsidies are extended to build cold storage units. In all 39 cold storage units were built with a built up area of 179,390 metric tonnes at a cost of Rs. 1280 crores. The farmers can

store their produce in those cold storages. (Source: Agricultural Marketing Department in AP)

iv) **State grading Laboratories on Agmark**: Under this program , the marketing department had established grading laboratories in the state for under taking grading in Agmark under the supervision of a Chief Chemist.

v) **Soil Testing laboratories**: Government had sanctioned 55 soil testing laboratories in the market yards at a cost of Rs.6.21 crores The respective Agricultural Market Committees meet the cost of the chemicals etc. to test the samples. Source : Agricultural Marketing Department in AP

vi) **DAATT Centres**: One DAATT (District Agricultural Advisory and Transfer of Technology) Center is established at each District headquarters (except in Hyderabad) in collaboration with Andhra Pradesh Agricultural University for the benefit of the farmers Necessary accommodation is provided by the Agricultural market Committees to these centres for the scientists.

vii) **Training Programmes**: Training classes are organized to the farmers at all market committees to educate farmers on the crops to be raised, the application of manures and pesticides, storage problems of food grains and other allied subjects with the cooperation of the other departments such as Agriculture department, Andhra Pradesh Agricultural University (APAU) , Horticulture department etc.

viii)**Rythu Bazars**: To serve the interests of both the farmers and the consumers, the Government set up Rythu Bazars through the Marketing Department. This programme is primarily for the vegetable producers and consumers. Rythu Bazar is a venue where the farmers bring their

vegetables and sell to the end consumers directly. This is to avoid the role of middlemen and both are benefited.

### 3.3.8 Minimum support prices of various agricultural commodities (according to crop year)

The government of India announces the minimum support price for certain crops from time to time as per the recommendations of the agricultural prices commission. The announcement of minimum support price (MSP) by the government of India did help to motivate the farmers to increase yield per hectare and production . The MSP is also a good contributor to the growth of agriculture in India. The MSP for various commodities for the past five years are listed below.

Table 3.20 (MSP announced by GOI in Rs. per quintal)

| Sl. No | Commo-dity | Variety | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 |
|---|---|---|---|---|---|---|---|
| 1 | Paddy | Common | 1,000 | 1,080 | 1,250 | 1,310 | 1,380 |
| | | "A" Grade | 1,030 | 1,110 | 1,280 | 1,345 | 1,400 |
| 2 | Wheat | | 1,120 | 1,285 | 1,350 | 1,400 | 1,450 |
| 3 | Cotton | Medium Staple | 2,500 | 2,800 | 3,600 | 3,700 | 3,750 |
| | | Long Staple | 3,000 | 3,300 | 3,900 | 4,000 | 4,050 |
| 4 | Sugarcane | | 139 | 145 | 170 | 210 | 220 |
| 5 | Groundnut in shell | | 2,300 | 2,700 | 3,700 | 4,000 | 4,000 |

(Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation. http://eands.dacnet.nic.in/PDF/Agricultural-Statistics-At-Glance2014.pdf)

### 3.3.9 Extension Services

Extension is a activity to transfer the knowledge and technology from the source viz. research organizations and universities to the farmers.

Government of India had introduced several programmes of extension over a period of time.

The government also introduced many community development extension programs like National Extension Service (NES) Blocks in 1953, the Intensive Agricultural District Program (IADP) in 1961-62, the Intensive Agricultural Area program (IAAP) IN 1964-65, the High Yielding Variety Program ( HYV) 1966-67, and the Small and Marginal Farmers` Development Programs (SMFDP) IN 1969-70. In mid-seventies "Training and Visit (T&V)" system of extension was promoted in different states. The Indian council of Agricultural Research (IARI) and the State Agricultural universities together has assisted in taking the new technologies to the farmers through programs like National Demonstration Project, Operational Research Project, the Lab to Land Program, the Krishi Vigyan Kendras.

The extension programmes of the government had played a very major role in Green Revolution during late 60's where in the farmers had to be introduced to the new high yielding varieties, the improved use of fertilizers and pesticides and the new irrigation concepts. The new technology was successfully taken to the farmers with the help of the extension programs.

**Krishi Vigyan Kendras:**

Indian Council of Agricultural Research, New Delhi a public sector research organization had taken up the task of establishing KVKs ( Krishi Vigyan Kendras) through its Agricultural Extension Division. The major activities of its Agricultural Extension Division are assessment, refinement and demonstration of technology/products through a network of KVKs. There are 642 Krishi vigyan Kendras in India of which 34 are established in combined Andhra Pradesh. There are 44 Agricultural Technology

Information Centers (ATIC) established under ICAR institutes and State Agricultural Universities. The Division is headed by Deputy Director-General (Agricultural Extension).

The thrust areas of the division through KVKs are

- Assessment, refinement and demonstration of technology/products
- Training of farmers
- Single window delivery system for technology products, diagnostic services and information through Agricultural Technology Information centres.
- Development of gender-specific technologies
- Creation of awareness about improved agricultural technologies among the farmers.

Achievements of KVK s :

- Established a network of 642 Krishi Vigyan Kendras (KVK)
- Conducted 4189 on –farm trials on 537 technologies to identify their location specificity under different farming systems.
- Organized 53,974 Frontline Demonstrations (FLD) to demonstrate the production potential of newly released production technologies on the farmers` fields.
- Trained more than 1.0 million farmers and extension personnel in agriculture and allied fields.
- Conducted large number of extension activities benefiting about 4.19 million farmers.
- Production of more than 82,000 qt. of seeds and 10.2 million sapling/seedlings/livestock strains, besides various bio-products for availability to the farmers.
- Identified gender issues in agriculture at the National technology Information Center for Women in Agriculture.

- Continued functioning of 44 Agricultural Technology Information Centers in ICAR institutes and SAUs
- Organized 334 interface meetings involving scientists and development officials at the district level.

### 3.3.10 Information and Communication Technology

Information and Communication Technology is gaining currency in agriculture sector as well. The technology is being used to transfer the information, knowledge and technology in the shortest possible time. Farmers in earlier days used to depend on radio, television and newspapers for acquiring the information. The information may be about the weather, the market information like prices, market arrivals etc. Now the ICT (Information and Communications Technology) is being used to guide the farmers on the use of fertilizers, plant protection measures, cultivation intricacies, etc.

MANAGE (National Institute of Agricultural Extension Management) is a public sector educational institution under the ministry of agriculture and farmers` welfare . It conducts Post Graduate Diploma Course in Agri Business Management, Post Graduate Diploma Course in Agri Extension Management and also Diploma in Agricultural Extension Services to Agri Input Dealers. It also conducts regular training programmes to farmers, extension officials and students and all the personnel connected with agriculture. It even uses video conferencing in its training programs.

ITC runs a web site where in they display the prices of the agricultural produce of various kinds on a daily basis. They even display the Mandi prices on daily basis. Agricultural information is being transmitted even in mobile phones of the farmers .The question is whether the farmer is making use of the ICT for his betterment needs to be studied.

#### 3.3.10.1 Kisan Call Centres

Department of agriculture and cooperation set up call centres across the country to answer the queries of the farmers. They work form 6.00 am to 10.00 pm. Agricultural scientists attend these calls and provide answers to the farmers problems. This scheme is operating from 2004.

## 3.4 Summary

Though India was basically an agrarian economy, due to a couple of severe droughts, it had to import food grains to meet the domestic food requirement. Around late 60`s a new agricultural strategy was devised by the Government of India which later was to be called as "Green Revolution", through which higher yields were achieved with special focus on food grains. Primarily Green revolution revolved around introduction of high yielding varieties (HYV), and provision of additional irrigational facilities, integrated development of dry areas, and adoption of modern farming techniques including improved plant protection measures, increased use of fertilizers. The result was very encouraging with food grain production increasing many-fold from 82 million tonnes in 1960-61 to about 265 million tonnes in 2013-14 attaining self-sufficiency in food grains. Simultaneously, the commercial crops and horticultural crop production was increased in the past sixty years substantially. Around the year 2000, the genetically Modified cotton (BT Cotton) was introduced and in just a decade, the cotton production increased from about 10 million bales in 2000-01 to about 37 million bales in 2013-14. During the last sixty years various agricultural policies were introduced including land reforms, several extension programs, Krishi Vigyan Kendras (KVK), liberal farm credit, introduction of crop insurance and minimum support price (MSP) etc.. Research and development was given top priority by the government research organizations and agricultural universities and the same was transferred to the farmers through "Lab to Land" and "Training & Visit" programs.

Post liberalization in 1991, the agricultural economy was opened up to world economy and India participated in World Trade Organization (WTO) and made export of Indian Agricultural Produce a reality.

Although there has been very significant growth in Indian Agriculture, in terms of yields of certain crops like Paddy, Wheat, Sugarcane, Tobacco etc. India lags behind good number of countries. There is a need to re-look at our efforts to take the Indian Agriculture to greater heights.

# CHAPTER - IV
# DATA ANALYSIS

## 4.0 Data Analysis

The primary data collected from the respondents was analysed in three sections:

Section I: The demographic profiles of the respondents analysed.

Section II: The data was analysed in percentages and observations made.

Section III: The statistical testing of Hypotheses was done in this section and findings noted.

## 4.1 Section I

### 4.1.1 Demographic Profile of the farmers surveyed

Demographic profiles of the respondents were captured. They will throw light on the differences among the regions. It may also throw up any influence of demographic profiles on the management practices.

#### 4.1.1.1 Number of farmers surveyed Region Wise

Table 4.1

| | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| Coastal Andhra | 225 | 33.3 | 33.3 |
| Telangana | 225 | 33.3 | 66.6 |
| Rayalaseema | 226 | 33.4 | 100.0 |
| Total | 676 | 100.0 | |

In all 676 farmers were surveyed by covering 225 in Guntur district(Coastal Andhra Pradesh), 225 in Karimnagar district (Telangana) and 226 in Kurnool district (Rayalaseema).

#### 4.1.1.2 Age of the farmers

Age profile of the respondents is captured to know how many of them are from lower age bracket and how many of them belong to higher age bracket. The age may not have an influence on the management practices, but any way, collection and analysis of the same is needed for further analysis.

Table 4.2

| Age | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| <=20 years | 7 | 1.0 | 1.0 |
| 21-30 years | 104 | 15.4 | 16.4 |
| 31-40 years | 191 | 28.3 | 44.7 |
| 41-50 years | 193 | 28.6 | 73.2 |
| 51-60 years | 126 | 18.6 | 91.9 |
| > 60 years | 55 | 8.1 | 100.0 |
| Total | 676 | 100.0 | |

Of the respondents surveyed, only 1% is less than 20 year old. 15.4 % of the farmers are between 21 and 30 years old. 28.3% of the farmers are between 31 to 40 years old. 28.6% of the farmers are 41 to 50 years old. 18.6% of the farmers are between 51 and 60 years. Only 8.1% of the farmers are of the age above 60 years.

#### 4.1.1.3 Educational qualification of the farmers

Respondents may have different educational qualifications. It may have some influence on the management practices. Hence the data on educational qualifications was sought and analysed.

Table 4.3

| Education | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| Nil | 263 | 38.9 | 38.9 |
| Primary | 206 | 30.5 | 69.4 |
| Secondary | 136 | 20.1 | 89.5 |
| College | 59 | 8.7 | 98.2 |
| University | 12 | 1.8 | 100.0 |
| Total | 676 | 100.0 | |

38.9% of the farmers never attended school. One needs to see whether such large percentage of farmers not attending school, would have any bearing on the management of value chain in agriculture. 30.5% of the farmers studied 5th class or less. 20.1% of the farmers attended secondary school i.e. 6th to 10th class. 8.7% of the farmers attended college. While only 1.8% of the farmers studied in university. A majority of the respondents (69.4%) had not attended the school or had been drop outs with very little formal education.

#### 4.1.1.4 Number of dependants

Each respondent was asked to mention the number of dependants in his family and the details are given in the Table below:

Table 4.4

| | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| Nil | 3 | .4 | .4 |
| 1-2 | 45 | 6.7 | 7.1 |
| 3-4 | 331 | 49.0 | 56.1 |
| 5-6 | 233 | 34.5 | 90.5 |
| > 6 | 64 | 9.5 | 100.0 |
| Total | 676 | 100.0 | |

Close to half of the farmers (49%) have 3-4 dependents. 34.5% of the farmers have 5-6 dependents. 9.5% of the farmers have above 6 dependents. 56.1% of the respondents have less than six dependants.

#### 4.1.1.5 Number of years of experience in cultivation

Number of years of experience in cultivation of the farmers is captured. This information will be useful to find out whether the farmers with more experience are managing the value chain in agriculture better than the farmers with less experience.

Table 4.5

| Years of experience | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| 1-5 Years | 54 | 8.0 | 8.0 |
| 6-10 Years | 123 | 18.2 | 26.2 |
| 11-15 Years | 132 | 19.5 | 45.7 |
| 16-20 Years | 124 | 18.3 | 64.1 |
| Above 20 Years | 243 | 35.9 | 100.0 |
| Total | 676 | 100.0 | |

A good 35.9% of the farmers are having more than 20 years of experience in cultivation. 18.3 % of the farmers are having 16-20 years of experience while 19.5% of the farmers are having 11-15 years of experience. 18.2% of the farmers are having 6-10 years of experience and only 8% of the farmers are having 1-5 years of experience. Majority of the farmers (54.2%) have experience of more than 15 years.

#### 4.1.1.6 Land holding size and classification of farmers (ownership + tenancy)

The information on land holding size is elicited to verify whether it has any bearing on the way they manage their value chain due to scale of the operations. Hence the information is solicited and given in in the Table below.

Table 4.6

| Class of farmers | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| Marginal | 140 | 20.7 | 20.7 |
| Small | 198 | 29.3 | 50.0 |
| Semi-Medium | 210 | 31.1 | 81.1 |
| Medium | 117 | 17.3 | 98.4 |
| Large | 11 | 1.6 | 100.0 |
| Total | 676 | 100.0 | |

(Source of classification: Ministry of agriculture and cooperation, Government of India defined the farmers as Marginal (less than 1 hectare), Small (1-2 hectares), Semi Medium (2-4 hectares), Medium (4-10 Hectares) and Large (above 10 hectares).

An analysis of the land holding size has been done of the respondents who are cultivating either own and tenancy land combined. Of the respondents interviewed, 20.7% are marginal, with less than one hectare, 29.3% are small, with holding size between one to two hectares, 31.1% are semi medium, with a holding of two to four hectares. Only 17.3% are medium, with a holding of four to ten hectares. A meagre 1.6% are large farmers with a holding of more than ten hectares.

Over 70% of the farmers (own+ tenancy) are marginal and small holding less than 2 hectares, which may have a bearing on the management of value chain.

#### 4.1.1.7 Wet /Dry Land holding of farmers

Of the respondents there are farmers who are having wet land exclusively and some others dry land exclusively. And there are others who have both wet and dry land. The responses for wet and dry was collected to examine if there are differences in management practices between wet land farmers and dry land farmers.

Table 4.7

| Class | Wet Land | % Wet Land | Dry Land | % Dry Land | Both | % Both | Total | % Total |
|---|---|---|---|---|---|---|---|---|
| Marginal | 157 | 52 | 96 | 44 | 62 | 40 | 315 | 46 |
| Small | 94 | 31 | 78 | 36 | 51 | 33 | 223 | 32 |
| Semi-Medium | 36 | 12 | 21 | 9 | 29 | 18 | 86 | 14 |
| Medium | 12 | 4 | 17 | 8 | 11 | 7 | 40 | 6 |
| Large | 2 | 0.7 | 7 | 3 | 3 | 2 | 12 | 2 |
| Total | 301 | 100 | 219 | 100 | 156 | 100 | 676 | 100 |
| Total | | 45 | | 32 | | 23 | | 100 |

(Source of classification: Ministry of agriculture and cooperation, Government of India defined the farmers as Marginal (less than 1 hectare), Small (1-2 hectares), Semi-Medium (2-4 hectares), and Medium (4-10 Hectares), Large (above 10 hectares)

The above analysis indicates that of the respondent surveyed, 45% are wet land farmers, 32% are dry land farmers and 23% have both wet and dry land. Of the wet land farmers, marginal and small farmers are 83%, semi-medium and medium are 16% and less than 1% is large farmers. Of the dry land farmers 80% are marginal and small farmers, 17% are semi-medium and medium farmers and 3% are large farmers. Of the farmers having both wet land and dry land, 77% are marginal and small farmers, 15% are semi-medium and medium farmers and 2% are large farmers.

It is observed that the vast majority of over 80% are marginal and small farmers having less than two hectares of wet land or dry land.

#### 4.1.1.8 Farmers cultivating different crops

The management of value chain may differ with the kind of crop raised. Hence the information on class of crops raised is elicited to analyse.

Table 4.8

| Farmers classification by crops | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| Only Food Grains | 274 | 40.5 | 40.5 |
| Only Commercial Crops | 62 | 9.2 | 49.7 |
| Only Horticultural Crops | 9 | 1.3 | 51.0 |
| More than on Crop | 331 | 49.0 | 100.0 |
| Total | 676 | 100.0 | |

40.5% of the farmers are raising food grains, 9.2% of the farmers are raising commercial crops, and 1.3% of the farmers are raising horticultural crops. And Close to half of the farmers (49%) are raising more than one crop.

#### 4.1.1.9 Source of water for irrigation-Region Wise

Farmers use various sources of water to irrigate their lands. They include canal water, bore wells, tank water or a combination of these apart from rain water.

Table 4.9

| Region | Canal | Bore well | Canal + Bore Well | Tank | Only Rain Fed | Total |
|---|---|---|---|---|---|---|
| Guntur | 134 | 32 | 57 | 1 | 1 | 225 |
| | 59.6% | 14.2% | 25.3% | 0.4% | 0.4% | 100.0% |
| Karimnagar | 4 | 203 | 3 | 1 | 14 | 225 |
| | 1.8% | 90.2% | 1.3% | 0.4% | 6.2% | 100.0% |
| Kurnool | 55 | 84 | 38 | 1 | 48 | 226 |
| | 24.3% | 37.2% | 16.8% | 0.4% | 21.2% | 100.0% |
| Total | 193 | 319 | 98 | 3 | 63 | 676 |
| | 28.6% | 47.2% | 14.5% | 0.4% | 9.3% | 100.0% |

In Guntur district 59.6% depend on canal water, 14.2% depend on bore wells and 25.3% depend on canal and bore well combination. In Kurnool district 37.2% depend on bore wells, 24.3% depend on canal water and 16.8% of them depend on a combination of canal and bore well water. The

most striking is that 90.2% of the farmers in Karimnagar district depend on bore well water.

At aggregate level, across all the three regions 28.6% depend on canal water, 47.2% depend on bore wells and 14.5% depend on a combination of canal and bore well water.

#### 4.1.1.10 Farmers owning Farm Equipment

The respondents were asked to list of farm equipment they own including bullocks. And the details are listed in the Table below.

Table 4.10

| Own farm equipment | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| Bullocks | 102 | 15.1 | 15.1 |
| Bullocks + Plough | 30 | 4.4 | 19.5 |
| Tractor | 32 | 4.7 | 24.3 |
| Bullocks + Plough + Tractor | 1 | .1 | 24.4 |
| None | 511 | 75.6 | 100.0 |
| Total | 676 | 100.0 | |

The table indicates that 511 of the 676 respondents do not own any of the farm equipment including bullocks

#### 4.1.1.11 Farmers hiring Farm Equipment

Over half the farmers (own + tenancy) being marginal and small, may not have the financial means to purchase the farm equipment or there may be other reasons for hiring the farm equipment. Hence the information on hiring of it is elicited.

Table 4.11

| Farm Equipment | Frequency | Per cent | Cumulative Per cent |
|---|---|---|---|
| Bullocks | 9 | 1.3 | 1.4 |
| Bullocks + Plough | 3 | .4 | 1.8 |
| Tractor | 203 | 30.0 | 32.4 |
| Bullocks + Plough + Tractor | 13 | 1.9 | 34.3 |
| Any two or more | 436 | 64.5 | 100.0 |
| Total | 664 | 98.2 | |
| Not answered | 12 | 1.8 | |
| Total | 676 | 100.0 | |

Almost all the farmers are using the hiring model as far as farm equipment is concerned. The analysis of the data on hiring farm equipment indicates that the farmers are choosing the hiring model rather than owning them.

## 4.2 Section II

### 4.2.1 Soil Testing done by farmers

Management of value chain in agriculture begins with knowing the level of fertility and soil structure. If the farmer knows the soil structure, he may choose the kind of suitable crop that he can raise in that land and which gets him higher profitability. Knowing the level of fertility, helps him to arrive at the right kind of fertilizers to be applied for the crop that he has chosen to raise. Hence the farmers were asked whether they got their soil tested and the results are in the Table 4.12.

Table 4.12

| Soil testing done | Per cent | Cumulative Per cent |
|---|---|---|
| Never | 73.2 | 73.2 |
| Rarely | 21.0 | 94.2 |
| Unsure | 0.3 | 94.5 |
| Sometimes | 5.0 | 99.6 |
| Always | 0.4 | 100.0 |
| Total | 100.0 | |

94.2% of the farmers hardly got their soil tested. A dismal 5% of the farmers sometimes got their soil tested. If they had not tested their soil, they may not know what fertilizer to apply, when and in which quantity. 94.2% of the farmers are not getting their soil tested. At the very first and critical step of soil testing, the farmers are not managing this part of the value chain well.

### 4.2.2 Relationship between age and soil testing

It is analysed to check the relationship between age and the practice of soil testing.

Table 4.13

| AGE | Soil Testing Done | | | | | Total |
|---|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always | |
| <=20 years | 6 | 1 | 0 | 0 | 0 | 7 |
| | 85.7% | 14.3% | 0.0% | 0.0% | 0.0% | 100.0% |
| 21-30 years | 82 | 16 | 1 | 5 | 0 | 104 |
| | 78.8% | 15.4% | 1.0% | 4.8% | 0.0% | 100.0% |
| 31-40 years | 142 | 40 | 0 | 8 | 1 | 191 |
| | 74.3% | 20.9% | 0.0% | 4.2% | 0.5% | 100.0% |
| 41-50 years | 140 | 42 | 1 | 9 | 1 | 193 |
| | 72.5% | 21.8% | 0.5% | 4.7% | 0.5% | 100.0% |
| 51-60 years | 83 | 33 | 0 | 9 | 1 | 126 |
| | 65.9% | 26.2% | 0.0% | 7.1% | 0.8% | 100.0% |
| > 60 years | 42 | 10 | 0 | 3 | 0 | 55 |
| | 76.4% | 18.2% | 0.0% | 5.5% | 0.0% | 100.0% |
| Total | 495 | 142 | 2 | 34 | 3 | 676 |
| | 73.2% | 21.0% | 0.3% | 5.0% | 0.4% | 100.0% |

The above table indicates 66-85% of the farmers irrespective of their age are not getting their soil tested. Irrespective of the age bracket, the farmers are not getting their soil tested.

### 4.2.3 Relationship between Educational qualification and soil testing

Having observed that the farmers are not getting their soil tested, the further analysis was done as to whether the formal educational qualification has any relation to the decision of soil testing.

Table 4.14

| Education | Total | | | | | |
|---|---|---|---|---|---|---|
| | Rarely | Unsure | Sometimes | Always | Rarely | Unsure |
| Nil | 79.8% | 16.0% | 0.0% | 3.4% | 0.8% | 100.0% |
| Primary | 68.9% | 26.2% | 0.5% | 4.4% | 0.0% | 100.0% |
| Secondary | 69.1% | 23.5% | 0.7% | 6.6% | 0.0% | 100.0% |
| College | 69.5% | 18.6% | 0.0% | 10.2% | 1.7% | 100.0% |
| University | 66.7% | 25.0% | 0.0% | 8.3% | 0.0% | 100.0% |
| Total | 73.2% | 21.0% | 0.3% | 5.0% | 0.4% | 100.0% |

In all the categories of level of formal education, over 90 % of them are not getting their soil tested which is very important in the value chain. The analysis indicates that irrespective of the level of education, the farmers are not getting their soil tested.

### 4.2.4 Relationship between years of experience and soil testing

Having noticed that farmers, irrespective of their educational qualification, farmers are not getting their soil tested, the researcher attempted to verify whether there is a relationship between years of experience in agriculture and the decision to get the soil tested.

Table 4.15

| Years Of Experience | Total | | | | | |
|---|---|---|---|---|---|---|
| | Rarely | Unsure | Some-times | Always | Rarely | Unsure |
| 1-5 Years | 77.8% | 18.5% | 1.9% | 1.9% | 0.0% | 100.0% |
| 6-10 Years | 69.9% | 22.0% | 0.0% | 7.3% | 0.8% | 100.0% |
| 11-15 Years | 72.0% | 24.2% | 0.0% | 3.0% | 0.8% | 100.0% |
| 16-20 Years | 68.5% | 27.4% | 0.0% | 3.2% | 0.8% | 100.0% |
| Above 20 Years | 77.0% | 16.0% | 0.4% | 6.6% | 0.0% | 100.0% |
| Total | 73.2% | 21.0% | 0.3% | 5.0% | 0.4% | 100.0% |

Over 95% of the respondents, irrespective of their years of experience in agriculture are not getting their soil tested. It clearly establishes the fact that, years of experience in cultivation has no bearing on the decision to get their soil tested. It appears that the farmers are following their culture of doing farming in a traditional way and are not following the modern farming techniques thus not able to manage their value chain well.

Soil testing is the first important activity which helps the farmers to understand the fertility levels of their soil and apply fertilizers based on the soil need. It is observed that the farmers irrespective of their age or education or years of experience are only following their traditional methods rather than adopt the new technology with respect to the soil testing.

### 4.2.5 Application of fertilizers based on systematic planning

The second and very important step in the value chain is to apply the right kind of fertilizers at right time based on systematic planning. Systematic planning is to study the requirement of various kinds of nutrients like nitrogen, phosphorous, potash and micro nutrients needed by the raised crop at right kind of timing and in right quantities. If the farmer is able to apply the fertilizers in such a manner, he will be able to achieve higher levels of yields. This aspect, the farmers may learn from the agricultural officers who are qualified to advice.

Table 4.16

| Application of fertilizers based on systematic planning | Per cent | Cumulative Per cent |
|---|---|---|
| Never | 73.4 | 73.4 |
| Rarely | 16.3 | 89.6 |
| Unsure | 1.2 | 90.8 |
| Sometimes | 8.4 | 99.3 |
| Always | 0.7 | 100.0 |
| Total | 100.0 | |

It is observed from the data that 89.6% of the farmers have not been applying fertilizers based on systematic planning which may lead to sub optimal yields.

The farmers are applying fertilizers based on approximations and traditional perceptions but not based on systematic planning. This also appears to be the tradition of the farmers rather than modern farming techniques to manage the value chain.

### 4.2.6 Relationship between educational qualification and application of fertilizers based on a systematic planning

Further analysis is made to see whether the educational qualification has any bearing on the application of fertilizers.

Table 4.17

| Education | Total | | | | | |
|---|---|---|---|---|---|---|
| | Rarely | Unsure | Sometimes | Always | Rarely | Unsure |
| Nil | 79.8% | 12.5% | 0.4% | 6.8% | 0.4% | 100.0% |
| Primary | 66.5% | 20.4% | 1.5% | 10.7% | 1.0% | 100.0% |
| Secondary | 73.5% | 15.4% | 2.9% | 7.4% | 0.7% | 100.0% |
| College | 72.9% | 18.6% | 0.0% | 6.8% | 1.7% | 100.0% |
| University | 50.0% | 25.0% | 0.0% | 25.0% | 0.0% | 100.0% |
| Total | 73.4% | 16.3% | 1.2% | 8.4% | 0.7% | 100.0% |

It is observed from the data that 92.3% of the farmers who never went to school are not applying fertilizers based on scientific study. Same way,

86.9% of the farmers who went to primary school, 88.9% of the farmers who went to secondary school, 92.5% of the farmers who attended college and 75% of the farmers who attended university also are not applying fertilizers based on scientific study. Only insignificant number of farmers who attended university followed systematic application of fertilizers that too only some times. The data suggests that the farmers irrespective of their educational qualification are not applying fertilizers based on systematic planning and there by not managing the value chain well.

### 4.2.7 Relationship between years of experience and application of fertilizers based on systematic planning

Further analysis is done to test whether years of experience in cultivation has any bearing on application of fertilizers based on systematic planning, because it is assumed that years of experience may make them adapt systematic planning of fertilizer application.

Table 4.18

| Application of Fertilizers based on Systematic Planning | | | | | |
|---|---|---|---|---|---|
| | **Never** | **Rarely** | **Unsure** | **Sometimes** | **Always** |
| 1-5 Years | 81.5% | 9.3% | 0.0% | 9.3% | 0.0% |
| 6-10 Years | 74.8% | 12.2% | 0.8% | 11.4% | 0.8% |
| 11-15 Years | 69.7% | 19.7% | 0.8% | 9.8% | 0.0% |
| 16-20 Years | 72.6% | 24.2% | 0.8% | 2.4% | 0.0% |
| Above 20 Years | 73.3% | 14.0% | 2.1% | 9.1% | 1.6% |
| Total | 73.4% | 16.3% | 1.2% | 8.4% | 0.7% |

The result of the above study shows that 90.8% of the farmers who have 1-5 years of cultivation experience, 87% of the farmers having 6-10 years of experience, 89.4% of the farmers having 11-15 years of experience, 96.8% of the farmers having 16-20 years of experience and 87.3% of the farmers having above 20 years of cultivating experience are not applying fertilizers based on systematic planning.

The analysis indicates that the farmers whether educated or not, having experience or not, are not applying fertilizers based on systematic planning and are not able to manage the value chain to maximize the yields.

### 4.2.8 Input supply chain (Seeds, fertilizers and pesticides)

The next important step in the management of value chain is to select and sow the seeds, apply fertilizers and spray pesticides at right and appropriate timing. To know whether the farmers are getting theses input supplies in time, they were asked about the timely availability of these inputs.

#### 4.2.8.1 Timely availability of inputs - region wise analysis

Region wise analysis was done to check the availability of inputs like seeds, fertilizers and pesticides in time for the operations because it may have a direct bearing on the yields.

Table 4.19

| Region | Timely availability of Inputs - Region wise | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always |
| GUNTUR | 1.3% | 7.6% | 0.9% | 51.6% | 38.7% |
| KARIMNAGAR | 0.4% | 0.0% | 0.0% | 46.2% | 53.3% |
| KURNOOL | 0.4% | 0.0% | 1.3% | 49.6% | 48.7% |
| Total | 0.7% | 2.5% | 0.7% | 49.1% | 46.9% |

The result shows, that 53% of the farmers of Karimnagar district, 48.7% of the farmers of Kurnool district, and 38.7% of the farmers of Guntur district received the inputs always in time. 51.6% of the farmers in Guntur district, 49.6% of the farmers in Kurnool district and 46.2% of the farmers in Karimnagar district received the inputs in time, only some times.

On the whole, at the aggregate level, only half the farmers across all three regions are able to manage to receive the inputs in time and the balance half received in time only some times. In this aspect of receipt of inputs in time, farmers of Karimnagar district are able to manage the value chain

better than the farmers of Kurnool district and farmers of Kurnool district are able to manage the value chain better than the Guntur farmers. Farmers of Guntur district are at the lowest among three regions in terms of receiving inputs in time for the operations.

#### 4.2.8.2 Availability of quality inputs - Region wise

Availability of quality inputs is very important to maximize the yields. Region wise data is collected from the respondents and analysed about the availability of quality inputs.

Table 4.20

| Region | Availability of Quality Inputs –Region Wise | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always |
| GUNTUR | 7.1% | 12.4% | 0.4% | 44.4% | 35.6% |
| KARIMNAGAR | 0.0% | 0.9% | 0.0% | 49.8% | 49.3% |
| KURNOOL | 0.0% | 0.0% | 0.0% | 41.6% | 58.4% |
| Total | 2.4% | 4.4% | 0.1% | 45.3% | 47.8% |

As far as receipt of quality inputs are concerned, Kurnool farmers are ahead of other two districts. 58.4% of the farmers in Kurnool district are receiving the quality inputs always, while 49.3% of the farmers in Karimnagar district are always receiving the quality inputs always, and with Guntur farmers are the least with only 35.6% of the farmers receiving the quality inputs always. Whereas similar percentages of farmers are receiving quality inputs some times in all the three regions (Karimnagar - 49.8%, Guntur - 44.4%, Kurnool - 41.6%). At the aggregate level, 93.1% of the farmers are receiving quality inputs.

With respect to procuring quality inputs, farmers in Kurnool district are able to manage their value chain better than farmers in Karimnagar district and farmers in Karimnagar district are able to manage better the value chain better than the farmers in Guntur district. The lowest is the Guntur district with respect to receiving quality inputs which is very crucial for maximizing the yields.

### 4.2.9 Input costs rising faster than the prices of the output - Regional wise analysis

The output prices and inputs costs are important for the profitability of the crop raised. The respondents are questioned about the movement of the prices of inputs versus the output. The responses are tabulated and analysed.

Table 4.21

| Region | Increase in Input Costs more than Increase in Output Price - Region wise | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.4% | 0.0% | 4.4% | 61.3% | 33.8% |
| KRMNGR | 0.0% | 0.0% | 4.0% | 95.1% | 0.9% |
| KRNL | 0.4% | 0.4% | 2.7% | 73.5% | 23.0% |
| Total | 0.3% | 0.1% | 3.7% | 76.6% | 19.2% |

The response from the farmers from all the three regions is the same that the costs of inputs are rising faster than the prices of output. 95.6% of the farmers in Guntur district, 96% of the farmers in Karimnagar district and 96.5% of the farmers in Kurnool district have categorically stated that the costs of inputs are rising faster than the prices of output. Management of value chain in agriculture by the farmers across all the three regions is severely constrained by weaknesses at the industry level.

### 4.2.10 Infrastructure

The next aspect in the management of value chain is the management of basic agricultural infrastructure like power, irrigation and rural road connectivity.

#### 4.2.10.1 Power

Power supply has two important aspects of supply. One is the sufficiency of time and the timing for which it is supplied and the second is the right amount of voltage that is supplied.

**a) Power supply for sufficient time - region wise analysis**

Power is a very important agricultural infrastructure which is needed for irrigation purposes. Provision of power is the responsibility of the governments. How the governments and the farmers are able to manage power for required amount of time for irrigating his land is the question and the responses of which are tabulated and analysed in the table below.

Table 4.22

| Region | Rating of Power supply for sufficient time - Region wise | | | |
|---|---|---|---|---|
| | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.9% | 0.0% | 86.2% | 12.9% |
| KARIMNAGAR | 0.9% | 0.4% | 96.9% | 1.8% |
| KURNOOL | 4.4% | 3.1% | 92.0% | 0.4% |
| Total | 2.1% | 1.2% | 91.7% | 5.0% |

The analysis of power supply region wise was tabulated above and the result is that uniformly across all the three regions the farmers agreed that the power is made available for sufficient time. (99.1% in Guntur district, 98.7% in Karimnagar district, and 92.4% in Kurnool district). Across all the three regions, at aggregate level, 96.7% of the respondents agreed that the power supply is made available to them for sufficient time.

Power being a very important infrastructure, adequacy of power supply in all the three regions is definitely a facilitator for them in managing the value chain in agriculture.

**b) Availability of power in sufficient voltage- Regional wise analysis**

The next question that arises is whether the farmer is able to get the power in required voltage. If the voltages drop below certain level, the motors burn adding substantial cost escalation to the farmer. Hence the next question about the sufficiency of voltage of the power being received.

Table 4.23

| Region | Rating of power –sufficient voltage-Region Wise | | | |
|---|---|---|---|---|
| | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 1.3% | 0.0% | 91.1% | 7.6% |
| KARIMNAGAR | 1.3% | 0.4% | 98.2% | 0.0% |
| KURNOOL | 12.8% | 6.6% | 80.5% | 0.0% |
| Total | 5.2% | 2.4% | 89.9% | 2.5% |

The region wise data shows that in Karimnagar district 98.2% of the farmers responded that the power is being supplied in sufficient voltage, while 98.6% of the farmers in Guntur district responded that the power is supplied in sufficient voltage. But in Kurnool district only 80.5% of the farmers responded that the power supplied is with sufficient voltage. 12.8% of the farmers in Kurnool district are of the opinion the voltage supplied is inadequate. To that extent the farmers in Kurnool district are at a disadvantage than the farmers in Guntur and Karimnagar districts to manage the value chain. Across all the three regions at aggregate level, the power is supplied at required voltage, which is a good facilitator in the value chain.

### 4.2.10.2 Irrigation

Once the power is made available for required amount of time and also voltage, the following logical question is whether the farmers are able to manage their irrigation part of agricultural infrastructure better. Hence the next question deals with irrigation aspect.

**a) Sources of water for irrigation - region wise analysis**

In addition to monsoon rains, farmers depend on various sources of water for irrigation. The region wise data collected in this regard is tabulated and analysed.

Table 4.24

| Region | Irrigation -Source-Region wise | | | | |
|---|---|---|---|---|---|
| | Canal | Bore well | Canal + Bore Well | Tank | Only Rain Fed |
| GUNTUR | 59.6% | 14.2% | 25.3% | 0.4% | 0.4% |
| KRMNGR | 1.8% | 90.2% | 1.3% | 0.4% | 6.2% |
| KRNL | 24.3% | 37.2% | 16.8% | 0.4% | 21.2% |
| Total | 28.6% | 47.2% | 14.5% | 0.4% | 9.3% |

59.6% of the farmers in Guntur district use canal water for their irrigation and only 14.2% of them use bore wells. A good quarter of them (25.3%) use a combination of canal water and bore wells. Quite contrast is the farmers in Karimnagar district. 90.2% of them depend on bore wells for their irrigation. In Kurnool district 37.2% of the farmers depend on bore wells and 24.3% of them depend on canal irrigation and 16.8% of the use a combination of canal water and bore wells. Each of the sources of irrigation has its unique challenges of managing irrigation. In Karimnagar district the farmers need to depend on the power supply along with the costs of digging bore wells and the ground water level in their area. Managing the bore well is more complex. To that extent Karimnagar district farmers face more constraints to manage the irrigation part of value chain in agriculture.

**b) Sufficiency of water for irrigation purpose-region wise analysis**

Sufficiency of irrigation facilities is very critical for achieving higher yields. The respondents region- wise were questioned whether they were receiving sufficient water for irrigation purpose. The answers are tabulated and analysed in the Table below.

Table 4.25

| Region | Sufficiency of Irrigation Region Wise | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.0% | 1.8% | 4.0% | 89.3% | 4.9% |
| KARIMNAGAR | 36.9% | 24.9% | 0.4% | 37.3% | 0.4% |
| KURNOOL | 38.9% | 9.7% | 12.4% | 38.5% | 0.4% |
| Total | 25.3% | 12.1% | 5.6% | 55.0% | 1.9% |

The above analysis has thrown up significant differences in the sufficiency of irrigation region wise. While in Guntur district 94.2% of the farmers experienced sufficiency of irrigation, only 38.9 % in Kurnool district and mere 37.7% in Karimnagar district experienced sufficiency of irrigation.

The most striking feature is that 61.8% of the farmers in Karimnagar district are experiencing insufficient irrigation, which is originating from the source of irrigation - bore wells. The next in order of insufficiency are the farmers (48.6%) in Kurnool district.

Across all the three regions at aggregate level, only 56.9% of the farmers agreed with the sufficiency of water for irrigation. The sufficiency of irrigation appears to be influenced by the source of irrigation, which is that the farmers depending on bore well irrigation are facing more constraints in managing the irrigation part of value chain.

#### 4.2.10.3 Rural road connectivity - Region wise analysis

Rural road connectivity is very important infrastructure which enables the farmer to transport the inputs from the market to the farm and output from the farm to the market. Better the rural road connectivity, lower the cost of transportation. Hence the farmers were questioned whether the rural road connectivity is good.

Table 4.26

| Region | Region wise response on good rural road connectivity | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.4% | 10.7% | 4.4% | 78.7% | 5.8% |
| KARIMNAGAR | 1.3% | 36.0% | 4.9% | 56.9% | 0.9% |
| KURNOOL | 10.6% | 50.0% | 3.1% | 36.3% | 0.0% |
| Total | 4.1% | 32.2% | 4.1% | 57.2% | 2.2% |

The best connectivity appears to be in Guntur district with 84.5% of the farmers endorsing it. Followed by the Karimnagar district with 61.8% of the farmers agreeing to good rural road connectivity. The lowest is the Kurnool district in which 36.3% of the farmers agree that the rural road connectivity is good.

At aggregate level across all the three regions, only 59.4% of the farmers accept that the connectivity is good. The farmers in Kurnool district face serious constraint to manage the transportation costs in the value chain followed by Kurnool district farmers.

### 4.2.11 Mechanization

#### 4.2.11.1 Suitable mechanization is introduced and available to farmers

Farmers need various kindly of machines to cultivate his land right from the ploughing stage. He either uses traditional plough with bullocks or tractor to plough his land. Similarly he needs various kind of machines to sow/plant the crop, inter cultivation, spraying pesticides and weedicides, harvesting, thrashing, winnowing, grading, packing, transportation etc. There are certain machines available in the market. Farmers either own some of the machines, or hires the machines to take up cultivation activities. Sometimes he even hires in the cultivation activity itself like sowing, harvesting, thrashing, winnowing, grading packing on contract basis etc. The researcher solicited the answers for the question whether suitable machinery is introduced or not. The responses were captured.

Table 4.27

| Region | Region wise response on introduction and availability of suitable mechanization) | | | | |
|---|---|---|---|---|---|
| | **Mostly disagree** | **Disagree** | **Unsure** | **Agree** | **Mostly agree** |
| GUNTUR | 2.7% | 26.2% | 8.0% | 53.8% | 9.3% |
| KARIMNAGAR | 0.0% | 7.1% | 1.3% | 79.1% | 12.4% |
| KURNOOL | 9.3% | 3.5% | 4.9% | 79.2% | 3.1% |
| Total | 4.0% | 12.3% | 4.7% | 70.7% | 8.3% |

Both in Karimnagar (91.5 %) and Kurnool (82.3%) districts, the farmers opined that the suitable farm machinery is introduced/ available. Guntur district appears to be lagging behind both Karimnagar and Kurnool district farmers with only 63.1 % of the farmers of that district agreeing that suitable farm machines are introduced and available. Of the three districts, Guntur district farmers may face serious constraint in managing their value chain from farm machinery stand point.

#### 4.2.11.2 Suitability of traditional mechanization to the marginal and small farmers

It is noted that marginal and small farmers constitute over 80% on ownership basis or pure tenancy basis. But if one counts the land being cultivated (ownership + tenancy), more than 50% of the farmers are marginal and small farmers cultivating 2 hectares or less. Therefore, any development of mechanization may have to keep in mind the suitability of such machinery for marginal and small farmers. Hence the question.

Table 4.28

| Region | Region wise response on suitability of traditional mechanization to marginal and small farmers | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 1.8% | 33.3% | 11.1% | 48.4% | 5.3% |
| KARIMNAGAR | 0.0% | 7.1% | 1.8% | 79.1% | 12.0% |
| KURNOOL | 0.0% | 27.9% | 3.1% | 67.3% | 1.8% |
| Total | 0.6% | 22.8% | 5.3% | 64.9% | 6.4% |

Karimnagar stands out best in terms of the suitability of the introduced farm machinery to the marginal and small farmers with 91.1% of the farmers endorsing it, followed by Kurnool district farmers (69.1%) endorsing the same. Guntur district lags behind with only 53.7% of the farmers agreeing to the suitability of the introduced farm machinery to the marginal and small farmers. Guntur district farmers may face serious maximum constraints in managing their value chain from farm machinery stand point with respect to marginal and small farmers.

The logical next question is about technology development and transfer.

### 4.2.12 Technology Development and Transfer

Technology development and transfer is very critical in maximizing the yields as well as marketing the produce well to fetch the best possible price. The technology could range from seed technology to planting technology to agronomical practices, pesticide/ weedicide management, to harvesting and post harvesting technologies and extending up to usage of information and communication technology. Farmers are asked whether they are aware of the latest farming technologies.

#### 4.2.12.1 Awareness of the farmers about the latest farming technologies

From time to time the universities and research organization (both private and public) develop and transfer the latest farming technologies. The

logical question is whether the farmers are aware of them, which is what the answers were elicited for.

Table 4.29

| Region | Awareness of farmers about the latest farming technologies-Region wise | | | | |
|---|---|---|---|---|---|
| | Not at all aware | Not aware | Unsure | Aware | Fully aware |
| GUNTUR | 9.8% | 50.7% | 10.2% | 28.9% | 0.4% |
| KRMNGR | 1.8% | 49.8% | 1.8% | 46.2% | 0.4% |
| KRNL | 13.7% | 76.5% | 4.4% | 5.3% | 0.0% |
| Total | 8.4% | 59.0% | 5.5% | 26.8% | 0.3% |

Kurnool district farmers are the lowest in awareness levels of latest farming technologies with 90.2% of the farmers claiming unawareness. 60.5% of the farmers in Guntur district are not aware of the latest farming technology and 51.6% of the farmers in Karimnagar farmers are not aware. Kurnool farmers face the serious constraint in managing their value chain.

### 4.2.13 Finance and farm credit

Finance and credit are very important inputs for the farmers to carry on his activities. He may use it for purchase of inputs or engaging labour or use it pre and post-harvest activities. He may source it from different agencies-public or private.

#### 4.2.13.1 Sources of crop loan - region wise analysis

There are governmental, cooperative and private organizations which extend farm credit or crop loan to the farmers. The researcher attempted to find out the source of the crop loan which may have a bearing on the rate of interest. If the loans are obtained from private money lenders or input dealers, the cost of the loans may be high affecting the profitability, hence the question of source of crop loans.

Table 4.30

| Region | Source of the crop loan-Region Wise | | | | |
|---|---|---|---|---|---|
| | Co-op credit society | Commercial bank | Pvt. money lenders | Family members | More than One |
| GUNTUR | 25.3% | 28.9% | 37.8% | 2.2% | 5.8% |
| KARIMNAGAR | 28.9% | 56.4% | 9.8% | 0.9% | 4.0% |
| KURNOOL | 8.8% | 43.4% | 26.5% | 0.0% | 21.2% |
| TOTAL | 21.0% | 42.9% | 24.7% | 1.0% | 10.4% |

52.2%, 85.3% and 52.2% of the farmers from Guntur, Karimnagar and Kurnool districts respectively are sourcing their crop loans from public finance institutions like commercial banks and cooperative credit societies. Farmers in Karimnagar district are able to manage to source of finance at the lower cost than their counter parts in Guntur and Kurnool districts. 37.8% of the farmers from Guntur district and 26.5% of the farmers from Kurnool district are borrowing from private money lenders and hence are facing serious cost constraints from interest point of view. At aggregate level, across all the three regions 63.9% of the farmers are sourcing their funds from public finance institutions and 24.75 are sourcing from private money lenders.

Farmers in Karimnagar district are borrowing the least (10.7%) from private money lenders, may be because they are receiving crop loans in sufficient quantum from public institutions, and therefore are having significant advantage of cost of finance positively affecting the profitability.

#### 4.2.13.2 Adequacy of crop loan received—region wise analysis

It is not enough if the farm credit or crop loan is made available to the farmer. The adequacy of the crop loan received is also important, lest the farmer is put to hard ships. If a loan at low interest is not adequate, the farmer is forced to borrow from another source which charges high interest rate which hurts the profitability of the crop raised.

Table 4.31

| Region | Adequacy of crop loan received- Region wise | | | Total |
|---|---|---|---|---|
| | Disagree | Unsure | Agree | |
| GUNTUR | 38.2% | 9.3% | 52.4% | 100.0% |
| KARIMNAGAR | 2.2% | 9.3% | 88.4% | 100.0% |
| KURNOOL | 22.6% | 4.0% | 73.5% | 100.0% |
| TOTAL | 21.0% | 7.5% | 71.4% | 100.0% |

88.4% of the farmers in Karimnagar district agree that they receive adequate crop loans, while 73.5% of the farmers in Kurnool district receive adequate crop loans and only 52.4% of the farmers in Guntur district receive the crop loans adequately. Among the three regions, Guntur district farmers comparatively may face more constraints than the farmers in other two districts in managing the value chain.

### 4.2.14 Crop insurance

Crop insurance is one important ways of mitigating the risk in raising the crop and meeting any unexpected losses in the crop . The researcher attempted to know how many farmers are really aware of the crop insurance.

#### 4.2.14.1 Awareness of Crop Insurance

Table 4.32

| Region | Awareness Crop Insurance - Region wise | | | |
|---|---|---|---|---|
| | Not at all aware | Not aware | Aware | Very Aware |
| GUNTUR | 5.8% | 40.9% | 6.2% | 47.1% |
| KARIMNAGAR | 2.2% | 24.0% | 0.4% | 73.3% |
| KURNOOL | 0.0% | 55.8% | 0.4% | 43.8% |
| TOTAL | 2.7% | 40.2% | 2.4% | 54.7% |

The highest awareness of the crop insurance is noticed in the Karimnagar district (73.3%). Quite contrasting is the low level of awareness (less than

half of the farmers) in Guntur district (47.1%) and in Kurnool district (43.8%). It is clear from the above analysis that the Karimnagar farmers are better placed to manage the insurance part of the value chain better than their counter parts in Guntur and Kurnool districts.

The next logical question was whether the farmers suffered crop loss any time in the past for the crop that they were forced to insure.

#### 4.2.14.2 Crop loss occurrence at some point in time after insuring-region wise analysis

The information on whether there were crop losses at some point is useful to check whether they received the reimbursement. Hence the said information is elicited.

Table 4.33

| Region | Crop Loss Occurrence Post Insurance - Region wise | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 13.8% | 26.2% | 3.1% | 56.9% | 0.0% |
| KARIMNAGAR | 4.9% | 8.9% | 0.4% | 85.8% | 0.0% |
| KURNOOL | 0.9% | 3.1% | 0.9% | 94.7% | 0.4% |
| TOTAL | 6.5% | 12.7% | 1.5% | 79.1% | 0.1% |

94.7% of the Kurnool farmers incurred unforeseen crop losses at some point in time, while 85.8% of the farmers in Karimnagar district incurred unforeseen losses. The lowest losses were recorded in Guntur district with 56.9% of the farmers claiming unforeseen losses at some point in time.

Whether these farmers who incurred losses were reimbursed with insurance amount will be seen in the next table.

#### 4.2.14.3 Insurance reimbursement after insuring and incurring crop losses—region wise analysis

Having insured the crop and having incurred unforeseen crop losses, it is very important to know whether the farmers received the insurance reimbursement. Hence the following question.

Table 4.34

| Region | Insurance reimbursement on Crop Loss-Region wise | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always |
| GUNTUR | 80.9% | 7.6% | 1.3% | 10.2% | 0.0% |
| KARIMNAGAR | 79.6% | 16.9% | 0.0% | 3.6% | 0.0% |
| KURNOOL | 86.7% | 11.5% | 0.4% | 0.9% | 0.4% |
| TOTAL | 82.4% | 12.0% | 0.6% | 4.9% | 0.1% |

It is very pathetic to note that 88.5% , 96.5% and 98.2% of the farmers in Guntur , Karimnagar and Kurnool districts respectively hardly received the insurance reimbursement despite suffering unforeseen crop losses.

The farmers across the regions are being very severely constrained in managing their insurance part of the value chain. There appears a systemic problem in the agricultural insurance sector.

### 4.2.15 Agricultural extension

Agricultural extension is an important support function which helps farmer to maximize his value chain by gaining knowledge and skill.

#### 4.2.15.1 Agricultural extension officers are knowledgeable

The agricultural department of every state government has agricultural extension officers who are agricultural graduates or post graduates, and who are expected to know more about agricultural science. These agricultural extension officers are also expected to update their scientific and technical knowledge in agriculture and are expected to disseminate the information and knowledge to the farmers from time to time. Do the

farmers think that these extension officers are knowledgeable to advise the farmers, is the question next posed and answers elicited and analyzed in the Table 4.2.25.

Table 4.35

| Region | Extension officers knowledgeable to advise the farmers-region wise | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 3.6% | 8.4% | 15.6% | 69.3% | 3.1% |
| KARIMNAGAR | 0.0% | 41.8% | 9.8% | 48.4% | 0.0% |
| KURNOOL | 0.4% | 37.2% | 7.1% | 55.3% | 0.0% |
| TOTAL | 1.3% | 29.1% | 10.8% | 57.7% | 1.0% |

Lack of knowledge of agricultural extension officers hampers the farmers efforts in finding solutions to their farm problems. Extension is a very important link in the value chain which appears not helping farmers much. Only in Guntur district the farmers (72.4%) agree that the agricultural extension officers are knowledgeable. In both the other districts i.e. Karimnagar and Kurnool districts only half of the farmers said that the agricultural extension officers are knowledgeable.

#### 4.2.15.2 Model farmers knowledgeable and useful to the farmers

In united Andhra Pradesh across all the three regions, one local farmer in each village is appointed as model farmer and is paid a salary every month by the state government. The selection of the farmer is mandated that the model farmer is a farmer himself, and is very knowledgeable and capable of advising the other farmers in the village on issues of cultivation. The question whether he is knowledgeable is asked and answers solicited and analysed.

Table 4.36

| Region | Model farmers knowledgeable and useful to the farmers | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 23.1% | 47.1% | 4.4% | 25.3% | 0.0% |
| KARIMNAGAR | 3.6% | 41.3% | 3.6% | 50.7% | 0.9% |
| KURNOOL | 15.5% | 80.5% | 0.9% | 3.1% | 0.0% |
| TOTAL | 14.1% | 56.4% | 3.0% | 26.3% | 0.3% |

There are regional differences in the opinion of the farmers about the usefulness of the model farmers. 86% of the farmers in Kurnool district, 70.2% of the farmers in Guntur district opined that the model farmers are not knowledgeable and not useful to them. Only half of the farmers ie 51.6 % of the farmers in Karimnagar district said that their model farmers are knowledgeable and useful to them.

The data analysis indicates that the farmers are more constrained in Kurnool and Guntur districts in upgrading their knowledge through the model farmers, and to that extent they are constrained in the value chain.

#### 4.2.15.3 Awareness of the farmers about more profitable crop than the one they are raising now-region wise analysis.

Traditionally farmers had been growing certain crops in their farms either because their fore fathers were growing the same crop over generation or they themselves were growing the same and were used to growing them. The researcher attempted to find out whether the farmers are aware of any other crop that can be grown in their farm given the soil condition and the suitability of that crop to that field, which is more profitable.

Table 4.37

| Region | Awareness of farmers about more profitable alternate crop that can be grown in their farm | | | |
|---|---|---|---|---|
| | Not at all aware | Not aware | Unsure | Aware |
| GUNTUR | 2.7% | 41.8% | 9.8% | 45.8% |
| KARIMNAGAR | 0.9% | 48.4% | 4.9% | 45.8% |
| KURNOOL | 10.6% | 77.0% | 6.2% | 6.2% |
| TOTAL | 4.7% | 55.8% | 7.0% | 32.5% |

Half of the farmers in Guntur and Karimnagar districts (45.8% each) are aware of the more profitable crop than the one that they are currently raising, which also means that the other half of the farmers do not know. Pathetic is the situation of the farmers in Kurnool district (87.6%) are not aware. It clearly shows that there is a deficiency in the management of value chain, because the crop that they raise is very important in getting them profits. Farmers in Kurnool district are severely constrained on this aspect.

### 4.2.16 Agricultural Labour

Labour is an important input in the farming activity. There are two aspects of labour in the context of agriculture. One is the availability and the other is the cost. The cost affects the profitability of the crop raised by the farmer.

#### 4.2.16.1 Opinion about the increasing labour costs - Region wise analysis

Labour is required throughout the period of growing the crop to perform various agronomical functions on the farm. The cost of labour forms a big chunk in the value chain. Therefore, the opinion of the farmers about the rising costs of labour is very important, and hence the question.

Table 4.38

| Region | Opinion about the increasing labour costs - Region wise | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.0% | 0.9% | 6.7% | 65.3% | 27.1% |
| KARIMNAGAR | 0.0% | 24.9% | 4.0% | 69.3% | 1.8% |
| KURNOOL | 0.4% | 5.8% | 4.4% | 64.2% | 25.2% |
| TOTAL | 0.1% | 10.5% | 5.0% | 66.3% | 18.0% |

92.4%, 89.4% and 70.1% of the farmers in Guntur, Kurnool and Karimnagar districts respectively agree that the labour costs are increasing very high reducing their profitability.

The analysis of the data reveals that increasing labour costs are severe constraints in the value chain for the farmers, which has a negative influence on the profitability of the crop raised.

### 4.2.17 Agricultural Marketing

Post-harvest the farmer takes up an activity of selling his produce. He will enquire where and when he will get the most remunerative price for his produce. Sometimes he gets the market information and sometimes not. Does he post pone his selling if he gets information that the price is likely to go up is examined.

#### 4.2.17.1 Preference of the farmer to hold the produce to sell at a later date than at harvest time (even if he has information about likely increase in price) - Food grains - region wise analysis

Food grain farmers after harvesting their crop, have a choice to sell the produce immediately after harvest or hold, store and sell it at a later date to fetch a better price. Many a time the price of the produce, especially the food grains, is estimated to be the lowest at the time of harvest because the produce arrivals will be the largest at the time of harvest. A question was asked to the farmers whether they would prefer to hold the produce to sell at

a later date, even if they had advance information about the likely price upward movement.

Table 4.39

| Region | Preference to hold the produce to sell at later time - food grains - Region wise | | | |
|---|---|---|---|---|
| | Prefer the least | Not prefer | Not sure | Prefer |
| GUNTUR | 26.2% | 48.4% | 7.1% | 18.2% |
| KARIMNAGAR | 0.4% | 79.1% | 1.8% | 18.7% |
| KURNOOL | 0.4% | 61.9% | 4.9% | 32.7% |
| TOTAL | 9.0% | 63.2% | 4.6% | 23.2% |

79.5% of the farmers in Karimnagar do not prefer to hold the produce to sell at a later date to maximize the price realization.74.6 % of the farmers in Guntur district do not prefer to hold the produce. And 62.3% of the farmers in Kurnool district do not prefer to hold. At the aggregate level across all the three regions, 72.2% of the farmers do not prefer to hold the produce. On the whole, a vast majority of farmers do not intend to hold the produce to sell at a later date when they can get better prices, for various reasons.

#### 4.2.17.2 Preference of the farmer to hold the produce to sell at a later date than harvest time (even if he has information about likely increase in price) - Commercial crops - region wise analysis

Having observed that majority of the food grain farmers did not prefer to hold the produce to sell at an appropriate time, the researcher attempted to elicit answers for similar question from commercial crops farmers. The data is tabulated and analysed in the Table below.

Table 4.40

| Region | Preference to hold the produce to sell at later time - commercial crops - Region wise | | | | |
|---|---|---|---|---|---|
| | Prefer the least | Not prefer | Not sure | Prefer | Prefer the most |
| GUNTUR | 21.3% | 22.2% | 9.8% | 44.4% | 2.2% |
| KARIMNAGAR | 0.0% | 70.7% | 4.4% | 24.9% | 0.0% |
| KURNOOL | 0.0% | 51.8% | 2.2% | 45.6% | 0.4% |
| TOTAL | 7.1% | 48.2% | 5.5% | 38.3% | 0.9% |

70.7% of the farmers in Karimnagar district do not prefer to hold the produce (commercial) to sell at a later appropriate time to maximize the price realization. 51.8% of the farmers in Kurnool district also do not prefer to hold the produce. In Guntur district 43.5% of the farmers do not prefer to hold. At the aggregate level across both the states, 55.3% of the famers do not prefer to hold the produce.

The comparative data analysis shows that majority of the commercial crop producers do not intend to hold the produce to sell later. Among the three regions, Karimnagar farmers are facing the significant constraints in managing the value chain in this aspect. Comparing with the food grains farmers (23.2%) , commercial crop producers ( 39.2%) are holding the produce a little better than the food grain farmers.

#### 4.2.17.3 Rating of financial soundness of the farmers - region wise analysis

A question was posed to the respondents to rate their financial condition from very low to high. The financial condition of the farmers may have an influence on many aspects of value chain.

Table 4.41

| Region | Rating of financial soundness of the farmers - Region wise analysis | | | |
|---|---|---|---|---|
| | Very low | Low | Average | High |
| GUNTUR | 7.1% | 39.6% | 37.8% | 15.6% |
| KARIMNAGAR | 0.0% | 25.8% | 51.1% | 23.1% |
| KURNOOL | 3.5% | 36.7% | 47.8% | 11.9% |
| TOTAL | 3.6% | 34.0% | 45.6% | 16.9% |

88.1% of the farmers in Kurnool district rated their financial condition from average to very low. 74.6% of the farmers in Guntur district rated their financial condition from average to very low. And 76.9% of the farmers in Karimnagar district rated their financial condition from average to very low. At the aggregate level across all the three regions 83.1% of the farmers rated their financial condition from average to very low. The data shows that across the regions the average to very low financial condition which is a severe constraint.

#### 4.2.17.4 Poor financial condition is the reason for distress sale

Having understood that a vast majority of the farmers, (whether of food grains or commercial crops) resort to distress sale, an analysis is done to find out whether poor financial condition is the reason for distress sale.

Table 4.42

| Poor financial condition-reason for distress sale | Per cent | Cumulative Per cent |
|---|---|---|
| Mostly disagree | 0.4 | 0.4 |
| Disagree | 24.3 | 24.7 |
| Unsure | 3.3 | 28.0 |
| Agree | 68.6 | 96.6 |
| Mostly agree | 3.4 | 100.0 |
| Total | 100.0 | |

When farmers were asked whether poor financial condition is the reason for distress sale, 72% of the farmers agreed that they resort to distress sale

due to poor financial condition. Only 24.7% of the farmers opined that financial condition is not the reason for distress sale.

#### 4.2.17.5 Influence of the land holding size to the distress sale - food grain crops

Further analysis was done to verify if there is any influence of land holding size on distress sale.

Table 4.43

| Farm Holding Size | Preference to hold the produce to sell at later time - food grains - Region wise | | | |
|---|---|---|---|---|
| | Prefer the least | Not prefer | Not sure | Prefer |
| Marginal | 20.7% | 67.9% | 2.9% | 8.6% |
| Small | 8.6% | 69.2% | 6.6% | 15.7% |
| Semi- Medium | 5.2% | 62.4% | 4.3% | 28.1% |
| Medium | 3.4% | 53.0% | 4.3% | 39.3% |
| Large | 0.0% | 18.2% | 0.0% | 81.8% |
| Total | 9.0% | 63.2% | 4.6% | 23.2% |

Percentage preferences to hold the produce of food grains by marginal, small, semi medium, medium and large farmers are 8.6%, 15.7%, 28.1%, 39.3%, and 81.8% respectively. Since over 80% of the farmers are marginal and small farmers, their holding capacity is very limited, and they are not able to manage the value chain to their advantage. The above analysis clearly shows that as the land holding size is getting bigger, the food grains farmer is tending towards holding the produce of food grains to sell at a later date.

#### 4.2.17.6 Influence of land holding size on distress sale - commercial crops

Similar exercise is done to find out the influence of land holding size on the preference to hold the commercial crops to sell at a later appropriate time.

Table 4.44

| Farm Holding size | Preference to hold the produce to sell at later time - commercial crops - Region wise | | | | |
|---|---|---|---|---|---|
| | Prefer the least | Not Prefer | Not Sure | Prefer | Prefer the most |
| Marginal | 15.7% | 52.1% | 7.1% | 22.9% | 2.1% |
| Small | 7.6% | 50.0% | 9.1% | 33.3% | 0.00% |
| Semi-Medium | 3.3% | 46.2% | 2.9% | 46.7% | 1.0% |
| Medium | 3.4% | 47.0% | 2.6% | 46.2% | 0.9% |
| Large | 0.0% | 18.2% | 0.0% | 81.8% | 0.0% |
| Total | 7.1% | 48.2% | 5.5% | 38.3% | 0.9% |

In case of commercial crops, the marginal and small farmers (25.0% and 33.3% respectively) are a little bit more tending to hold the produce compared to the food grains farmers (8.6% and 15.7% respectively) . In case of commercial crops also, there is an influence of land holding size on the tendency to hold the produce. Larger the holding size, more the tendency to hold the produce to sell at a later date.

#### 4.2.17.7 Preferred buyers—Region wise analysis

The farmer has a choice of buyers to whom he can sell his produce to. The important ones in the buyer list are middlemen or commission agents, private companies or millers, government agencies. It is important to know to whom is the farmer selling his produce to. The preference of buyer may have an influence on the price realization of the produce as well as the convenience. Hence the next question is about who is the preferred buyer. Region wise data is tabulated and analysed.

Table 4.45

| Region | Preferred Buyer | | | |
|---|---|---|---|---|
| | Middleman | Miller/ Pvt. Company | Govt. Agency | More than One |
| GUNTUR | 82.7% | 14.2% | 0.9% | 2.2% |
| KARIMNAGAR | 30.2% | 36.9% | 25.3% | 7.6% |
| KURNOOL | 97.8% | 0.4% | 0.9% | 0.9% |
| TOTAL | 70.3% | 17.2% | 9.0% | 3.6% |

The data analysis indicates that the dependence on middlemen is less in Karimnagar district ( 30.2%), while it is quite highest in Kurnool district (97.8%) followed by Guntur district (82.7%). In Karimnagar district 36.9% of the farmers prefer to sell to millers/private agencies directly and 25.3% of them prefer to sell to government agencies.

The preference of buyer may have a bearing on the price realization.

#### 4.2.17.8 Low price realization due to sale to middlemen-region wise analysis

A question was posed to the farmers whether they are realizing lesser price for their produce, if they preferred the middleman as preferred buyer. And the region wise data is tabulated and analysed in the Table below.

Table 4.46

| Region | Low Price realization due to sale to middlemen-Region wise | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.0% | 8.9% | 12.9% | 66.7% | 11.6% |
| KARIMNAGAR | 0.9% | 41.3% | 5.3% | 52.0% | 0.4% |
| KURNOOL | 1.3% | 17.3% | 1.8% | 78.3% | 1.3% |
| TOTAL | 0.7% | 22.5% | 6.7% | 65.7% | 4.4% |

79.6% of the farmers in Kurnool district said that they are receiving low prices due to sale to middlemen. 78.3 % of the farmers in Guntur district said that they are receiving low prices due to sale to middlemen. And 52.4% of the farmers in Karimnagar district said that they are receiving low prices due to sale to middlemen. At the aggregate level across all the three regions 70.1% of the farmers experienced lower prices for their produce due to sale to middlemen. It is clear from the data that selection of buyer has an influence on the prices of the produce, which might be a constraint in the management of value chain.

#### 4.2.17.9 Existence of levy purchase on Minimum Support Price helps in better price realization-region wise analysis

The central government announces minimum support price from time to time and also purchase some products like food grains through levy. Information is elicited whether the existence of levy purchase helps create competition with the middlemen and help farmers realize higher prices.

Table 4.47

| Region | Better price realization if levy exists with MSP | | | |
|---|---|---|---|---|
| | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 7.6% | 8.4% | 79.6% | 4.4% |
| KARIMNAGAR | 1.8% | 2.2% | 95.6% | 0.4% |
| KURNOOL | 3.5% | 5.8% | 90.7% | 0.0% |
| TOTAL | 4.3% | 5.5% | 88.6% | 1.6% |

96% of the farmers in Karimnagar district agree that if the levy purchase exists, the prices they get will be better due to competition with the middlemen and other private agencies. 90.7% of the farmers in Kurnool district agree that if the levy purchase exists, the prices they get will be better. While in Guntur district 84% of the farmers agree that if the levy purchase exists, the prices they get will be better.

At the aggregate level across the three regions 90.2% of the farmers agree that if the levy purchase exists, the prices they get will be better. The opinion is uniform across the regions.

#### 4.2.17.10 Rating of the price realization of food grains - region wise analysis

The opinion of the farmers as to how they rate the price realization in case of food grains was sought. Farmers were asked to rate the price realization for the food grains produced in the current year.

Table 4.48

| Region | Rating of price realization Food Grains | | | |
|---|---|---|---|---|
| | Low | Average | High | Very High |
| GUNTUR | 0.4% | 30.7% | 58.2% | 10.7% |
| KARIMNAGAR | 0.9% | 45.8% | 42.2% | 11.1% |
| KURNOOL | 2.7% | 55.3% | 38.1% | 4.0% |
| TOTAL | 1.3% | 43.9% | 46.2% | 8.6% |

58% of the farmers in Kurnool district rated the price for their food grains from average to low, while 46.7% of the farmers in Karimnagar district rated the price for their food grains from average to low, and 31.7% of the farmers in Guntur district rated the price for their food grains from average to low.

At the aggregate level across the three regions 45.2% of the farmers rated the price for their food grains from average to low. On the whole, about half the farmers are of the opinion that the prices they get for their produce is low to average.

**1.2.17.11 Rating of price realization of commercial crops - region wise analysis**

Similarly commercial crop producing farmers were asked the same question of rating of the price realization in the current year. The region wise data is tabulated and analysed in the Table below.

Table 4.49

| Region | Rating of price realization- Commercial crops | | | |
|---|---|---|---|---|
| | Low | Average | High | Very high |
| GUNTUR | 14.7% | 49.3% | 35.6% | 0.4% |
| KARIMNAGAR | 10.2% | 70.7% | 19.1% | 0.0% |
| KURNOOL | 27.0% | 67.3% | 5.8% | 0.0% |
| TOTAL | 17.3% | 62.4% | 20.1% | 0.1% |

94.3% of the farmers in Kurnool district rated the prices for their commercial crop produce from average to low, while 80.9% of the farmers

in Karimnagar district rated the prices for their commercial crop produce from average to low, and 64% of the farmers in Guntur district rated the prices for their commercial crop produce from average to low.

At the aggregate level across the three regions 79.7% of the farmers rated the prices for their commercial crop produce from average to low.

The farmers across the three regions are facing constraints in receiving better prices for their commercial produce and hence are not able to manage their value chain well. The price realization for commercial crop farmers appear to be worse off than the food grain farmers.

#### 4.2.17.12 Rating of price realization of horticultural crops-region wise analysis

Similarly, horticultural crop producing farmers were asked the same question of rating of the price realization in the current year. The region wise data is tabulated and analysed in the Table below.

Table 4.50

| Region | Rating of price realization - Horticulture crops | | | |
|---|---|---|---|---|
| | Low | Average | High | Very high |
| GUNTUR | 34.2% | 31.6% | 32.9% | 1.3% |
| KARIMNAGAR | 24.4% | 39.6% | 36.0% | 0.0% |
| KURNOOL | 39.4% | 23.0% | 36.3% | 1.3% |
| TOTAL | 32.7% | 31.4% | 35.1% | 0.9% |

The data analysis shows that 65.8% of the farmers in Guntur district, 64% of the farmers in Karimnagar district and 62.3% of the farmers in Kurnool district rate their price realization for their horticultural produce from average to low. At aggregate level across both the states 64.1% of the farmers rated the prices from average to low. Majority of the farmers are receiving average to low prices for their horticultural produce, which is a constraint in the management of value chain.

#### 4.2.17.13 Low price realization of horticultural crops due to perishability

It is a common knowledge that the perishability of the horticultural produce like, fruits, vegetables and flowers is an important reason for fetching lower prices by the farmers. If adequate cold storage facilities made available to the farmers nearby, they will be able to store them and fetch better prices by selling at right time. Hence the question was asked whether they are receiving lower prices for their horticultural produce due to perishability.

Table 4.51

| Region | Low price realization of horticultural crops due to perishability. | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.4% | 21.8% | 10.7% | 53.8% | 13.3% |
| KARIMNAGAR | 0.0% | 1.8% | 1.3% | 92.4% | 4.4% |
| KURNOOL | 0.4% | 3.1% | 4.4% | 90.3% | 1.8% |
| TOTAL | 0.3% | 8.9% | 5.5% | 78.8% | 6.5% |

96.8% of the farmers in Karimnagar district, 92.1% of the farmers in Kurnool district agree that they are receiving low prices for their horticultural produce due to perishability. The situation in Guntur district is slightly better with 67.1% of the farmers claiming low prices for their horticultural produce. At the aggregate level across the three regions 85.3% of the farmers agreed that they are receiving low prices for their horticultural produce due to perishability. Lack of support from the related supporting agencies may be weakening the value chain.

#### 4.2.17.14 Agricultural Market yards:

Market yards are established by the state government at different locations to help farmers bring their produce there and get the remunerative price.

**a) Adequacy of market yards - region wise analysis**

Market yards are the venues where in farmers bring their produce to sell to agencies. These are established by the state governments to bring both farmers-the sellers and agencies-the buyers on one platform. There are about 300 such market yards in both Andhra Pradesh and Telangana put together. Are they sufficient? The researcher attempted to find out. Hence the question about the adequacy of the market yards for the 12 million farmers across both states.

Table 4.52

| Region | Adequacy of market yards—Region wise analysis | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 12.0% | 34.2% | 7.6% | 45.3% | 0.9% |
| KARIMNAGAR | 0.4% | 44.9% | 8.9% | 45.8% | 0.0% |
| KURNOOL | 0.0% | 61.5% | 1.8% | 36.7% | 0.0% |
| TOTAL | 4.1% | 46.9% | 6.1% | 42.6% | 0.3% |

In Kurnool district 61.5% of farmers opined that market yards are not adequate, while in Karimnagar district about half of the farmers (45.3%) felt that the market yards are not adequate. Similarly, in Guntur district 46.2% of the farmers opined that the market yards are inadequate. The next logical question arises about the usefulness of the market yards in getting better price realization. Answers for the same are elicited in the next question.

At aggregate level across regions 51% of the farmers said that the existing market yards are not adequate. While 42.9% of the farmers admitted that the existing market yards are adequate to meet the requirements. The opinion is quite divided.

**b) Middlemen and market yard officials are responsible for low price realization - region wise analysis**

Market yards are established by the state governments and are managed by the elected/nominated board members. Their mandate to facilitate the systems and processes at the market yards, bring the farmers and buyers on one platform and assist farmers in selling their produce at the best price possible. There is a popular perception that the farmer is being exploited at the market yards, which are in fact meant to help the farmers fetch better prices. The same is questioned.

Table 4.53

| Region | Low price due to middlemen & Market yard officials | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.9% | 12.0% | 14.2% | 64.0% | 8.9% |
| KARIMNAGAR | 0.0% | 29.3% | 8.9% | 61.3% | 0.4% |
| KURNOOL | 0.4% | 2.7% | 5.3% | 88.5% | 3.1% |
| TOTAL | 0.4% | 14.6% | 9.5% | 71.3% | 4.1% |

91.6% of the farmers in Karimnagar district, the highest among three districts opined that the middlemen and market yard officials are responsible for low price realization of their produce. 72.9% of the farmers in Guntur district expressed the same opinion. Among the three districts, Kurnool district farmers (61.7%) felt that middlemen and market yard officials are responsible for the low price realization. At aggregate level across regions 75.4% of the farmers expressed their opinion that the middlemen and market yard officials are responsible for the low price realizations. Among the three regions, Karimnagar farmers are facing the most severe constraints in realizing better prices at the market yards.

#### 4.2.17.15 Warehouses

There are ware houses built by the governments-central or state and also private agencies. Farmers can store their produce in them till they sell their produce. Ware houses charge the farmer rent for using the services of the ware houses.

**a) Adequacy of ware house facilities - region wise analysis.**

There are ware houses operated by the central government (Central ware housing corporation), State Government (state ware housing corporation), and private agencies (private ware houses). Together, there is certain amount of storage facility was created. The farmers could store their produce in these ware houses and sell the produce at appropriate time for fetching better prices. The farmers were asked to rate the availability of the ware houses in general.

Table 4.54

| Region | Warehouse Availability - region wise | | | |
|---|---|---|---|---|
| | Very low | Low | Average | High |
| GUNTUR | 18.2% | 31.1% | 22.7% | 28.0% |
| KARIMNAGAR | 1.8% | 61.8% | 33.8% | 2.7% |
| KURNOOL | 35.8% | 18.6% | 29.6% | 15.9% |
| TOTAL | 18.6% | 37.1% | 28.7% | 15.5% |

The Karimnagar farmers (63.6%) and Kurnool farmers (54.4%) and Guntur farmers (49.3%) opined that the warehouses availability in their region is low to very low. If the availability of the warehouses is low, farmers will not be able to store their produce to sell at an appropriate time to get better price realization.

#### 4.2.17.16 Knowledge gap exists between research organizations, agricultural officers and farmers - region wise analysis

It is the extension service organizations of the government which take up the responsibility of transferring information, knowledge and skills from

the research organizations and State Agricultural universities to the farmers, Very many such extension programmes have been launched in the last fifty years. It is examined if the farmer is receiving the information and knowledge or there is a gap.

Table 4.55

| Region | Agreement on Information & Knowledge Gap | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.4% | 20.9% | 11.1% | 64.4% | 3.1% |
| KARIMNAGAR | 0.0% | 5.8% | 5.8% | 88.4% | 0.0% |
| KURNOOL | 0.9% | 12.4% | 4.0% | 82.3% | 0.4% |
| TOTAL | 0.4% | 13.0% | 7.0% | 78.4% | 1.2% |

88.4% of the farmers in Karimnagar district opined that there exists a knowledge gap between research organizations, agricultural officers and the farmers, very closely followed by Kurnool district farmers with 82.7%. In Guntur district 67.5% of the farmers felt that there is knowledge gap. At aggregate level across regions 79.6% of the farmers experienced the knowledge gap. Both Karimnagar and Kurnool district farmers face the severe constraints in the knowledge aspect.

#### 4.2.17.17 Information and communication Technology (ICT)

Information and communication technology is gaining currency. It has an important role to play in the value chain of agriculture. Farmers can get various kinds of information from different sources. He can use the latest information and communication technology.

**a) Proper use of Information and communication technology leads to higher yield and price realization - region wise analysis**

Opinion of the farmers was sought about the use of information and communication technology and its positive influence on higher yields.

Table 4.56

| Region | Use of ICT leads to higher productivity | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 2.2% | 20.4% | 12.9% | 61.3% | 3.1% |
| KARIMNAGAR | 0.0% | 1.8% | 0.4% | 96.9% | 0.9% |
| KURNOOL | 0.4% | 8.0% | 11.1% | 79.2% | 1.3% |
| TOTAL | 0.9% | 10.1% | 8.1% | 79.1% | 1.8% |

97.8% of the farmers in Karimnagar district agree that the if the information and communication technology is used, the yields would improve. 80.5% of the farmers in Kurnool district and 64.4% of the farmers in Guntur district expressed the same opinion. At aggregate level across regions, 80.9% of the farmers said that if they use, information and communication technology, the yields would improve.

**b) Farmer is using Information and communication technology for better yields - region wise analysis**

With over 80% of the farmers across both the states agreeing that the use of information and communication technology would lead to higher yields, the next logical question was posed as to whether they are indeed using the said technology.

Table 4.57

| Region | Farmers are using ICT-Region wise analysis | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always |
| GUNTUR | 51.1% | 15.6% | 6.2% | 26.7% | 0.4% |
| KARIMNAGAR | 18.2% | 31.1% | 0.0% | 50.7% | 0.0% |
| KURNOOL | 73.5% | 21.7% | 0.4% | 4.4% | 0.0% |
| TOTAL | 47.6% | 22.8% | 2.2% | 27.2% | 0.1% |

Karimnagar district farmers appear to be better in usage of information and communication technology compared to their counter parts in Guntur and Kurnool districts. At least half of the farmers in Karimnagar district are sometimes using information and communication technology, while in

Kurnool district the least usage is there. In Guntur district a quarter of the farmers are sometimes using it. Information and communication technology is gaining currency fast to manage the value chain agriculture , in which Karimnagar farmers appear to be ahead of their counter parts in other districts.

#### 4.2.17.18 Agri processing units

Agri-processing units are established which use the agricultural produce as the raw material for its production. The farmer is asked about the price improvement for his produce in case the agri-processing units come up near their area.

**a) Agri processing units help in improving the price realization—region wise analysis**

Agri processing units use the agricultural produce as raw material and convert into processed foods. Or sometimes these units are used for preserving and packing the produce for export purposes. The question as to whether the establishment of agri processing units help in improving the prices was posed and answers elicited, tabulated and analysed in the Table below.

Table 4.58

| Region | Agri processing units help in getting better prices for farmers | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.0% | 23.6% | 16.0% | 60.4% | 0.0% |
| KARIMNAGAR | 0.4% | 16.0% | 3.6% | 79.1% | 0.9% |
| KURNOOL | 0.9% | 4.4% | 8.4% | 81.9% | 4.4% |
| TOTAL | 0.4% | 14.6% | 9.3% | 73.8% | 1.8% |

86.3 % of the farmers in Kurnool district, 80% in Karimnagar district, and 60.4% of the farmers in Guntur district had expressed their opinion that if

agri processing units are established in their area, they would get better prices for their produce. At aggregate level across regions, 75.6% of the farmers expressed the same opinion.

**b) Farmer got benefit from the agri processing units near his area—region wise analysis**

With over 75% of the farmers opining that the prices for their produce would improve if the agri processing units are established in their area, the next question was asked whether indeed, indeed they received the benefit from the agri processing units established near their area and the answers were elicited.

Table 4.59

| Region | Farmers got better prices from agri processing units near his area - Region wise | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always |
| GUNTUR | 28.4% | 9.3% | 24.9% | 36.4% | 0.9% |
| KARIMNAGAR | 29.3% | 24.9% | 2.7% | 43.1% | 0.0% |
| KURNOOL | 89.4% | 8.4% | 0.9% | 1.3% | 0.0% |
| TOTAL | 49.1% | 14.2% | 9.5% | 26.9% | 0.3% |

97.8% of the farmers in Kurnool district did not get any benefit from the agri processing units established near their area. The situation in the other two districts is a little better with 43.1% farmers in Karimnagar district and 37.3% of the farmers in Guntur district did receive better prices, though some times. Inspite of the establishment of agri processing units near their area, the farmers did not get much benefit from them-especially the Kurnool district farmers.

### 4.2.17.19 Agricultural Exports

Export of agricultural produce is generally estimated to help get better prices. The same is verified at farmer level with his personal experience.

**a) Exports help improve price realization—region wise analysis**

It is generally estimated that whenever exports of the agricultural produce takes place, the local prices for the farmers would improve. The question was posed to the respondents whether they agree with it. And the answers elicited were tabulated and analysed in the Table below.

Table 4.60

| Region | Exports help increase local prices for farmer | | | | |
|---|---|---|---|---|---|
| | Mostly disagree | Disagree | Unsure | Agree | Mostly agree |
| GUNTUR | 0.4% | 18.2% | 13.3% | 68.0% | 0.0% |
| KARIMNAGAR | 0.0% | 17.3% | 12.9% | 69.8% | 0.0% |
| KURNOOL | 0.4% | 19.5% | 5.3% | 73.9% | 0.9% |
| TOTAL | 0.3% | 18.3% | 10.5% | 70.6% | 0.3% |

74.8%, 69.8%, 68% of the farmers in Kurnool, Karimnagar and Guntur districts respectively opined that if the exports take place, their produce prices would improve. At aggregate level, across regions, 70.9% of the farmers expressed the same opinion.

By and large the opinion is quite uniform across all the three regions. A vast majority of the respondents opined that the prices of agricultural produce would improve with exports taking place.

**b) Farmers are engaged in agri exports in some form or other - region wise analysis**

For exporting any product, there are certain qualities, and packaging standards specified by the importers of those countries/ states. The exporters, to meet such standards, may involve the producers in the process. Is it happening in agricultural sector is the question, the researcher attempted to verify. Hence the question as to whether the farmers are involved in some for or other in the entire process of exports.

Table 4.61

| Region | Farmers' engagement in Exports | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always |
| GUNTUR | 54.2% | 11.1% | 20.9% | 13.8% | 0.0% |
| KARIMNAGAR | 81.8% | 9.3% | 1.8% | 7.1% | 0.0% |
| KURNOOL | 96.0% | 2.2% | 0.9% | 0.4% | 0.4% |
| TOTAL | 77.4% | 7.5% | 7.8% | 7.1% | 0.1% |

98.2% of the farmers in Kurnool district, 91.1% of the farmers in Karimnagar district have shared their opinion that they were seldom involved in the export process. But in Guntur district, the situation is a bit better, with only 65.3% of the farmers saying that they were not involved.

The data analysis shows that the farmers who grow the crops and whose product is exported are not being involved in the export process whether it is for quality maintenance or grading and packaging aspects.

**c) Farmers received better price realization whenever exports took place -region wise analysis**

The next logical question was whether indeed the farmers got the benefit of better price whenever exports took place of their produce. The answers are tabulated and analysed in the Table below.

Table 4.62

| Region | Farmers got better prices whenever exports happened | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Unsure | Sometimes | Always |
| GUNTUR | 13.3% | 10.2% | 27.1% | 48.4% | 0.9% |
| KARIMNAGAR | 8.9% | 20.9% | 13.8% | 52.0% | 4.4% |
| KURNOOL | 48.2% | 1.3% | 0.9% | 15.5% | 34.1% |
| TOTAL | 23.5% | 10.8% | 13.9% | 38.6% | 13.2% |

34.1% of the farmers in Kurnool district expressed their opinion that they indeed got better prices always from the exports. In the same district 15.5% of the farmers opined that they got the benefit some times. In Karimnagar and Guntur districts 52% and 48.4% respectively got the

benefit sometimes only. At the aggregate level across both the states, 13.2% got the benefit always, 38.6% got the benefit some times. The analysis shows that the exports and the increasing price benefits from them are not reaching the farmers fully.

## 4.3 Section III (Statistical Testing of Hypotheses))

### 4.3.1 Cronbach Alpha

The reliability of the variables is tested through Cronbach Alpha test. When the various variables are put through the Cronbach test, if the alpha value comes to about 0.60 and above, that means that the variables are really reliable and are quite homogenous. Cronbach alpha value for the entire 32 variables is calculated and given in the Table 4.63.

Table 4.63

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | No. of Items |
| .723 | 32 |

Interpretation: The Cronbach alpha value of reliability for all the 32 variable is 0.723.

Findings: All the variables which are put through the Cronbach alpha test are homogenous and are very much related. The reliability Cronbach alpha test was done for each of the components and all the four tests gave a result that they are very reliable.

### 4.3.2 Factor Analysis

When the variables are very many it is very difficult to analyse and come to some conclusion. In such a scenario, the variables are put through Factor analysis, which actually reduces the variables into limited number of components which can be easily analysed. This is also called reduction method. From the questionnaire, 32 variables were taken and factor analysis was done to reduce them to limited number of factors, so that

meaningful analysis and statistical tests could be done to draw proper conclusions.

Table 4.64

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0.814 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 7847.663 |
| | df | 496 |
| | Sig. | 0.000 |

Interpretation: The KMO measure of sampling adequacy is 0.814. The KMO value shows that the number of samples surveyed and tested are very much adequate. The Bartlett`s test of sphericity gave a significance of 0.000. Any significance level of less than 0.05 is considered accepted for the test. It means that the factor analysis test has a good fitness statistically.

Table 4.65

| Communalities | | |
|---|---|---|
| | Initial | Extraction |
| Usage_Of_ICT | 1.000 | .649 |
| Use_Of_ICT_For_Higher_Production | 1.000 | .348 |
| Awareness_Of_More_Profitable_Crops | 1.000 | .564 |
| Knowledge_Extention_Officers | 1.000 | .235 |
| Usefullness_Model_farmers | 1.000 | .488 |
| Awareness_Farming_Technology | 1.000 | .719 |
| Agreement_On_Knowledge_Information_Gap | 1.000 | .310 |
| Time_Availability_Inputs | 1.000 | .446 |
| Availability_Quality_inputs | 1.000 | .648 |
| Application_Fertilizers_On_Scientific_Study | 1.000 | .590 |
| Rating_Interest_Rate | 1.000 | .228 |
| Timeliness_Crop_Loan | 1.000 | .231 |
| Awareness_Crop_Insurance | 1.000 | .397 |
| Crop_Loss_Post_Insurance | 1.000 | .466 |
| Reimbursement_Insurance_On_Crop_Loss | 1.000 | .172 |
| Farming_Terchnolgies_Reach_Farmer | 1.000 | .695 |
| Farming_Tech_Suitability_Small_Med_Farmers | 1.000 | .702 |
| Introduction_Of_Suitable_Mechanization | 1.000 | .517 |

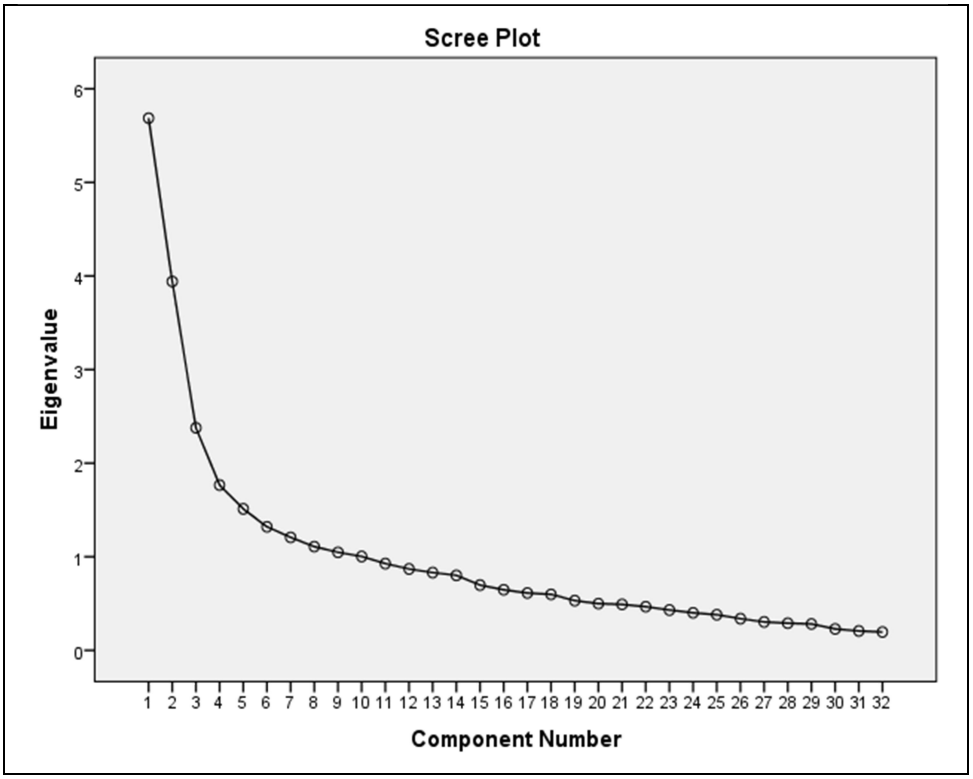
| Communalities | | |
|---|---|---|
| | Initial | Extraction |
| Suitability_Current_Mechanization_Small_ Marginal_Farmers | 1.000 | .624 |
| Rating_Electricity_Supply_Time | 1.000 | .291 |
| Rating_Electricity_Voltage | 1.000 | .354 |
| Better_Prodn_From_Better_Irrigation | 1.000 | .158 |
| Irrigation_is_Good | 1.000 | .382 |
| Adequacy_Market_Yards | 1.000 | .499 |
| Good_Road_Connectivity_Reduces_Costs | 1.000 | .438 |
| Warehouse_Availability | 1.000 | .649 |
| Hold_Intent_FoodGrains | 1.000 | .519 |
| Hold_Intent_Commercial | 1.000 | .548 |
| Low_Realization_from_Middlemen | 1.000 | .144 |
| Better_Realization_if_Levy_Exists | 1.000 | .151 |
| Does_Distress_Sale | 1.000 | .338 |
| Soil_Testing_Done | 1.000 | .272 |

Table 4.66

| Total Variance Explained | | | | | | |
|---|---|---|---|---|---|---|
| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
| | Total | % of Variance | Cum. % | Total | % of Variance | Cum. % |
| 1 Technology | 5.687 | 17.771 | 17.771 | 5.687 | 17.771 | 17.771 |
| 2 Production | 3.941 | 12.316 | 30.087 | 3.941 | 12.316 | 30.087 |
| 3 Infrastructure | 2.378 | 7.430 | 37.517 | 2.378 | 7.430 | 37.517 |
| 4 Marketing | 1.766 | 5.519 | 43.036 | 1.766 | 5.519 | 43.036 |
| 5 | 1.512 | 4.724 | 47.760 | | | |
| 6 | 1.320 | 4.125 | 51.885 | | | |
| 7 | 1.207 | 3.773 | 55.658 | | | |
| 8 | 1.108 | 3.464 | 59.122 | | | |
| 9 | 1.048 | 3.274 | 62.396 | | | |
| 10 | 1.003 | 3.134 | 65.530 | | | |
| 11 | .927 | 2.898 | 68.428 | | | |
| 12 | .869 | 2.717 | 71.145 | | | |
| 13 | .831 | 2.596 | 73.741 | | | |
| 14 | .801 | 2.505 | 76.245 | | | |
| 15 | .697 | 2.179 | 78.425 | | | |
| 16 | .647 | 2.023 | 80.448 | | | |
| 17 | .613 | 1.914 | 82.362 | | | |
| 18 | .598 | 1.870 | 84.232 | | | |
| 19 | .531 | 1.660 | 85.892 | | | |
| 20 | .499 | 1.560 | 87.452 | | | |

| Total Variance Explained | | | | | | |
|---|---|---|---|---|---|---|
| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
| | Total | % of Variance | Cum. % | Total | % of Variance | Cum. % |
| 21 | .491 | 1.533 | 88.985 | | | |
| 22 | .466 | 1.457 | 90.443 | | | |
| 23 | .431 | 1.347 | 91.790 | | | |
| 24 | .401 | 1.252 | 93.042 | | | |
| 25 | .381 | 1.191 | 94.232 | | | |
| 26 | .338 | 1.058 | 95.290 | | | |
| 27 | .304 | .949 | 96.239 | | | |
| 28 | .290 | .906 | 97.145 | | | |
| 29 | .282 | .881 | 98.026 | | | |
| 30 | .229 | .715 | 98.741 | | | |
| 31 | .207 | .646 | 99.387 | | | |
| 32 | .196 | .613 | 100.000 | | | |

Table 4.67



Pictorially the scree plot shows that four of the components extracted by principal component extraction method are explain the maximum possible variance.

Table 4.68

| **Rotated Component Matrix** | | | | |
|---|---|---|---|---|
| | Component | | | |
| | 1 | 2 | 3 | 4 |
| Awareness_Farming_Technology | .827 | | | |
| Farming_Terchnolgies_Reach_Farmer | .786 | | | |
| Usage_Of_ICT | .771 | | | |
| Awareness_Of_More_Profitable_Crops | .744 | | | |
| Farming_Tech_Suitability_ Small_Med_Farmers | .699 | | | |
| Usefullness_Model_farmers | .653 | | | |
| Awareness_Crop_Insurance | .524 | | | |
| Availability_Quality_inputs | | .738 | | |
| Application_Fertilizers_On_Scientific_Study | | -.688 | | |
| Suitability_Current_Mechanization_Small_ Marginal_Farmers | | .679 | | |
| Introduction_Of_Suitable_Mechanization | | .628 | | |
| Crop_Loss_Post_Insurance | | .619 | | |
| Time_Availability_Inputs | | .548 | | |
| Agreement_On_Knowledge_ Information_Gap | | .548 | | |
| Use_Of_ICT_For_Higher_Production | | .543 | | |
| Warehouse_Availability | | | .763 | |
| Adequacy_Market_Yards | | | .658 | |
| Good_Road_Connectivity_Reduces_Costs | | | .608 | |
| Hold_Intent_FoodGrains | | | | .646 |
| Hold_Intent_Commercial | | | | .574 |
| | | | | |
| **CRONBACH VALUES** | **0.874** | **0.637** | **0.677** | **0.806** |

Total 32 communalities were included in the factor analysis. The factor analysis extracted four very important factors through “Principal Component Extraction” method and they are 1) Technology management 2) Production management 3) Infrastructure management 4) Marketing Management. In this factor analysis the four factors contributed 43% of the cumulative variance, but they comprised 20 of the 32 communalities. The

Cronbach values for each of the components were arrived at. They are 0.874, 0.637, 0.677 and 0.806 for component 1, 2, 3 and 4 respectively. Therefore, each of the components passed the reliability test successfully. The rest of the communalities were analysed through percentage analysis and not a single communality was left un-analysed. Therefore, 100% of the communalities have been put through both factor analysis and also percentage analysis and the findings arrived at.

Findings: The factor analysis has thrown up four important components with cumulated percentage close to 50% of the rotation sums of squared loadings, which means that the four factors extracted explained the maximum amount of variance. Following are the four components which have been extracted by principal component extraction method.

1. Technology Management
2. Production Management
3. Infrastructure Management
4. Marketing Management

### 4.3.3 Ranking of Factors of Management

It is important to know the importance of each of the factors and their ranking so that one can attribute appropriate importance to each of the factors of management in the value chain.

The average of each component is calculated and the scores are arrived at. Then ranking has been done for the factors. The ranking shows the order of importance. The table below shows the scores and ranking.

Table 4.69 (Ranking of Factors)

| Sl No. | Component | Score | Rank |
|---|---|---|---|
| 1 | Production Management | 3.491 | 1 |
| 2 | Infrastructure management | 2.883 | 2 |
| 3 | Marketing Management | 2.636 | 3 |
| 4 | Technology Management | 2.592 | 4 |

Findings: The ranking makes the production management the most important (1st rank) followed by (in descending order of importance) infrastructure management, marketing management and technology management (ranks 2, 3 and 4 respectively).

### 4.3.4 Ranking of Regions with respect to Management of Factors of Value Chain

It is of paramount importance to know which of the regions is managing better than the others and also with respect to each of the factors of management in the value chain. This is one of the important objectives of the study.

Ranking of regions is done based on scores, to find out as to which region is faring better than the rest in order with respect to each the factors of value chain.

Table 4.70 (Scores of regions with respect to Management of Factors and Yields)

| Region | Technology Management | Production Management | Infrastructure Management | Marketing Management | Yields |
|---|---|---|---|---|---|
| Coastal Andhra | 2.65079 | 3.25167 | 3.09333 | 2.50667 | 2.97333 |
| Telangana | 3.02476 | 3.51944 | 2.85778 | 2.46444 | 2.42222 |
| Rayalaseema | 2.03477 | 3.27046 | 2.55310 | 2.82301 | 2.72566 |

Ranking of Regions with respect to Management of Factors and Yields

| Region | Technology Management | Production Management | Infrastructure Management | Marketing Management | Yields |
|---|---|---|---|---|---|
| Coastal Andhra | 2 | 3 | 1 | 2 | 1 |
| Telangana | 1 | 1 | 2 | 3 | 3 |
| Rayalaseema | 3 | 2 | 3 | 1 | 2 |

Findings: The result shows that Telangana region manages the technology factor the best followed in order by coastal Andhra Pradesh and Rayalaseema. Telangana region manages the production factor the best followed in order by Rayalaseema and Coastal Andhra Pradesh. With respect to managing the infrastructure factor, Coastal Andhra Pradesh leads the pack followed in order by Telangana and Rayalaseema. When it comes to Marketing management, Rayalaseema manages the best followed in order by Coastal Andhra Pradesh and Telangana.

In yield parameter, Coastal Andhra Pradesh manages to get the best yields followed in order by Rayalaseema and Telangana.

Table 4.71 (Ranking scores of regions from overall management of value chain)

| Sl No | Region | Score | Rank |
|---|---|---|---|
| 1 | Telangana | 2.97 | 1 |
| 2 | Rayalaseema | 2.87 | 2 |
| 3 | Coastal Andhra Pradesh | 2.67 | 3 |

Interpretation: The average score of all the four factors of management in the value chain is calculated. Telangana received a score of 2.97, followed by Rayalaseema 2.87 and Coastal Andhra Pradesh 2.67.

Findings: Telangana region ranks first followed by Rayalaseema region with second rank and Coastal Andhra Pradesh receiving the third rank.

### 4.3.5 Hypothesis Testing- ANOVA Tests

The significance of difference , between the means of two samples can be judged through Z-Test or T-Test. But to examine the significance of the difference amongst more than two sample means at the same time, ANOVA (Analysis Of Variance) is used. ANOVA is essentially a procedure for testing the difference among different groups of data for homogeneity. The essence of ANOVA is that the total amount of variation in a set of data is broken down into two types, that amount which can be attributed to chance and that amount which can be attributed to specified causes. Two estimates of population variance viz. one based on between samples variance and the other based on within the samples variance. The said two estimates of population variance are compared with F-Test, where in we work out

F = (Estimate of population variance based on between the samples variance) ÷ (Estimate of population variance based on within the samples variance)

This value of F is to be compared to the F-Limit for given degrees of freedom. If the F value calculated is equal or exceeds the F-limit value (to be seen from F Tables), then we may say that there are significant differences between the sample means.

Population Samples:

There are different sets of population samples data in this research.

Population Sample sets:

1. The data is collected from three population samples region wise - Telangana, Rayalaseema and Coastal Andhra Pradesh.
2. The data is collected from three population samples crop wise—farmers growing Food grains, farmers growing Commercial crops and farmers growing horticultural crops.

3. The data is collected from three population samples ownership wise - farmers cultivating exclusively owned land, farmers cultivating exclusively tenancy land and farmers cultivating both owned and tenancy land.
4. The data is collected from three population samples wet land or dry land cultivation - farmers cultivating exclusively wet land, farmers cultivating exclusively dry land and farmers cultivating both wet and dry land.
5. The data is collected from six population samples of farmers based on land holding size - marginal, small, semi medium, medium and large

To test whether there are significant differences among each set of sample, ANOVA tests were done.

*Hypothesis 1 - Purpose of the hypothesis*.

The data was collected from the farmers across three regions viz. Telangana (Telangana State), Rayalaseema (Andhra Pradesh State) and Coastal Andhra Pradesh (Andhra Pradesh State) with respect to various aspects of management of value chain. It is imperative to know whether there is a significant difference among the three regions with respect to the various aspects of management represented by the factors (from factor analysis). The same is tested using ANOVA. The test will throw up if there are significant differences or not, among the three regions and individually with respect to each of the factors like Technology, Production, Infra structure and marketing management, which information could be used for bringing in policy changes to support the farmers at regional level and at industry level.

**Hypothesis 1**

There is a significant difference among the farmers in the three regions (Telangana, Rayalaseema and coastal Andhra Pradesh) in managing value chain.

H1a: There is a significant difference among the farmers in the three regions (Telangana, Rayalaseema and coastal Andhra Pradesh) in managing value chain with respect to Technology Management

H1b: There is a significant difference among the farmers in the three regions (Telangana, Rayalaseema and coastal Andhra Pradesh) in managing value chain with respect to Production Management

H1c: There is a significant difference among the farmers in the three regions (Telangana, Rayalaseema and coastal Andhra Pradesh) in managing value chain with respect to Infra structure Management

H1d: There is a significant difference among the farmers in the three regions (Telangana, Rayalaseema and coastal Andhra Pradesh) in managing value chain with respect to Marketing Management.

Table 4.72 (Factors of Management - Regions - ANOVA Test)

| **Factor** | **Hypothesis** | **Degrees of freedom** | **F-Value** | **Sig.** | **Accept/ Reject** |
|---|---|---|---|---|---|
| Technology Management | H1a | 2 | 118.065 | 0.000 | Accepted |
| Production management | H1b | 2 | 34.923 | 0.000 | Accepted |
| Infrastructure management | H1c | 2 | 16.546 | 0.000 | Accepted |
| Marketing management | H1d | 2 | 10.502 | 0.000 | Accepted |

Interpretation: With respect to all the four factors viz. Technology Management, Production Management, Infra structure management and Marketing Management, the calculated F values are more than the table

values and also that the significance is less than 0.05, the null hypotheses were rejected and the alternate hypotheses were accepted.

Findings: There is significant difference among the three regions (Telangana, Rayalaseema and Coastal Andhra Pradesh ) with respect to the Technology Management, Production management, Infra Structure Management and Marketing Management.

*Hypothesis 2 - Purpose of the hypothesis.*

The data was collected from the farmers growing different crops like food grains, commercial crops and horticultural crops with respect to various aspects of management of value chain. It is imperative to know whether there is a significant difference among farmers growing different crops with respect to the various aspects of management represented by the factors (from factor analysis). The same is tested using ANOVA. The test will throw up if there are significant differences or not, among the farmers growing different crops and individually with respect to each of the factors like Technology, Production, Infra structure and marketing management, which information could be used for bringing in policy changes to support the farmers crop wise and at industry level.

**Hypothesis 2**

There is a significant difference among the farmers growing food grains, commercial crops and horticultural crops in managing value chain.

H2a: There is a significant difference among the farmers growing food grains, commercial crops and horticultural crops in managing value chain with respect to Technology Management.

H2b: There is a significant difference among the farmers growing food grains, commercial crops and horticultural crops in managing value chain with respect to Production Management.

H2c: There is a significant difference among the farmers growing food grains, commercial crops and horticultural crops in managing value chain with respect to Infra structure Management.

H2d: There is a significant difference among the farmers growing food grains, commercial crops and horticultural crops in managing value chain with respect to Marketing Management.

Table 4.73 (Factors of Management - Crops - ANOVA Test)

| **Factor** | **Hypothesis** | **Degrees of freedom** | **F-Value** | **Sig.** | **Accept/ Reject** |
|---|---|---|---|---|---|
| Technology Management | H2a | 3 | 5.942 | 0.001 | Accepted |
| Production management | H2b | 3 | 5.508 | 0.001 | Accepted |
| Infrastructure management | H2c | 3 | 9.719 | 0.000 | Accepted |
| Marketing management | H2d | 3 | 6.849 | 0.000 | Accepted |

Interpretation: With respect to all the four factors viz. Technology Management, Production Management, Infra structure management and Marketing Management, the calculated F values are more than the table values and also that the significance is less than 0.05, the null hypotheses were rejected and the alternate hypotheses were accepted.

Findings: There is significant difference among the farmers growing different crops with respect to the Technology Management, Production management, Infra Structure Management and Marketing Management.

*Hypothesis 3 - Purpose of the hypothesis*

The data was collected from the farmers who are marginal, small, semi medium, medium and large with respect to various aspects of management of value chain. It is imperative to know whether there is a significant difference among farmers who are marginal, small, semi medium,

medium and large with respect to the various aspects of management represented by the factors ( from factor analysis) . The same is tested using ANOVA. The test will throw up if there are significant differences or not among the farmers who are marginal, small, semi medium, medium and large, and individually with respect to each of the factors like Technology, Production, Infra structure and marketing management, which information could be used for bringing in policy changes to support the farmers holding different sizes of land holding because the problems faced by them could be different and need to be addressed accordingly.

**Hypothesis 3**

There is a significant difference among marginal, small, semi medium, medium and large farmers in managing value chain .

H3a: There is a significant difference among marginal, small, semi medium, medium and large farmers in managing value chain with respect to Technology Management.

H3b: There is a significant difference among marginal, small, semi medium, medium and large farmers in managing value chain with respect to Production Management.

H3c: There is a significant difference among marginal, small, semi medium, medium and large farmers in managing value chain with respect to Infra structure Management.

H3d: There is a significant difference among marginal, small, semi medium, medium and large farmers in managing value chain with respect to Marketing Management.

Table 4.74 (Factors of Management - land Holding size - ANOVA Test)

| Factor | Hypothesis | Degrees of freedom | F-Value | Sig. | Accept/ Reject |
|---|---|---|---|---|---|
| Technology Management | H3a | 4 | 2.260 | 0.061 | Rejected |
| Production management | H3b | 4 | 1.891 | 0.110 | Rejected |
| Infrastructure management | H3c | 4 | 1.542 | 0.188 | Rejected |
| Marketing management | H3d | 4 | 13.176 | 0.000 | Accepted |

Interpretation: With respect to three factors viz. Technology Management, Production Management and Infra structure Management the calculated F values are less than the table values and also that the significance is more than 0.05, the null hypotheses were accepted and alternate hypotheses were rejected. But with respect to Marketing Management the calculated F -value more than the table value and significance value is less than 0.05 and hence the null hypothesis is rejected and accepted and alternate hypothesis is accepted.

Findings: There is no significant difference among marginal, small, semi medium, medium and large farmers with respect to the Technology Management, Production management, Infra Structure Management. But with respect to Marketing Management there are is significant difference among the farmers holding different sizes of land holding.

### 4.3.6 Hypothesis Testing - Chi-Square Test

Chi Square is a statistical measure used in the context of sampling analysis for comparing a variance to a theoretical variance. As a non-parametric test, it "can be used to determine is categorical data shows the dependency or the two classifications are independent. It can also be used to make comparisons between theoretical populations and actual data when

categories are used." The chi square test is in fact a technique through use of which it is possible to i) test the goodness of fit ii) test the significance of association between two attributes iii) test the homogeneity or the significance of population variance.

As a test of independence chi square test enables to explain whether or not two attributes are associated. The Pearson chi square statistic is a test to see whether the two variables are independent or not. If the significance value is small enough (conventionally sig. must be less than 5% ie 0.05, then reject the null hypothesis. Thus variables are independent and gain confidence in the hypothesis that they are some way related. The P-Value is the probability of observing a sample statistic as extreme as the test statistic.

Sample sets of attributes to be tested:

1. The influence of management of factors (independent variable) on the yield (dependent variable).
2. The influence of education (independent variable) on the factors of management (dependent variable).
3. The influence of years of experience in cultivation (independent variable) on the factors of management (dependent variable).

To test the above sets of attributes for influence of independent variables on dependent variable, chi square tests were done.

*Hypothesis 4 - Purpose of the hypothesis*

During the statistical testing the influence of the independent variable on the dependent variable needs to be tested. Such analysis will help understand the relationships between variables. To check whether the factors of management in the value chain have any influence on the yield / level of production is of great importance. For the said purpose Chi Square test is used to check the relationship between these important variables.

The influence of the factors of management individually in the value chain on the yield is tested statistically through use of chi square.

**Hypothesis H4**

The Factors of Management have significant influence on the yield

H4a: Technology management has an influence on yield

H4b: Production Management has an influence on yield

H4c: Infrastructure Management has an influence on yield

Table 4.75 (Factors of Management - Yield - Chi-Square Test)

| Component | Hypothesis | Degrees of freedom | Chi-Square Value | Sig. | Accepted/ Rejected |
|---|---|---|---|---|---|
| Technology Management | H4a | 9 | 28.220 | 0.001 | Accepted |
| Production Management | H4b | 6 | 8.450 | 0.207 | Rejected |
| Infrastructure Management | H4c | 9 | 24.221 | 0.004 | Accepted |

Interpretation: With respect to two factors viz. Technology Management and Infra structure management the calculated Chi-square values are more than the table values and also that the significance is less than 0.05, the null hypotheses were rejected and alternate hypotheses were accepted. But with respect to Production Management the calculated Chi-square value is less than the table value and significance value is more than 0.05 and hence the null hypothesis is accepted and alternate hypothesis is rejected.

Findings: Technology Management and yield are some way related and Technology Management has an influence on yield. Similarly Infrastructure Management and yield are some way related and Infrastructure management has an influence on yield. But the aberration is the Production management, which appears not to have an influence on

yield, which is not understandable. There may be other factors beyond production management influencing yield.

*Hypothesis 5 - Purpose of the hypothesis*

During the statistical testing the influence of the independent variable on the dependent variable needs to be tested. Such analysis will help understand the relationships between variables. To check whether demographic factors viz. education and number of years of experience have any influence on the individual factors of management in the value chain is of great importance. For the said purpose Chi Square test is used to check the relationship between these important variables.

**Hypothesis H5**

Demographic factors viz. education and years of experience influence the adoption of new technology management.

H5a: Education influences on soil testing.

H5b: Education influences application of fertilizers through systematic planning.

H5c: Education influences use of ICT (Information and Communication Technology)

H5d: Number of years of experience influences on soil testing.

H5e: Number of years of experience influences application of fertilizers through systematic planning.

H5f: Number of years of experience influences use of ICT (Information and Communication Technology)

Table 4.76 (Demographics - Adoption of New technology - Chi Square Test)

| Demography | Hypothesis | Technology | Chi-Square value | df | Sig. | Result |
|---|---|---|---|---|---|---|
| Education | H5a | Soil Testing | 21.029 | 16 | 0.177 | Rejected |
| | H5b | Fertilizer Application Through systematic planning | 22.619 | 16 | 0.124 | Rejected |
| | H5c | Use of ICT | 19.287 | 16 | 0.254 | Rejected |
| Years of experience | H5d | Soil Testing | 20.726 | 16 | 0.189 | Rejected |
| | H5e | Fertilizer Application Through systematic planning | 24.929 | 16 | 0.071 | Rejected |
| | H5f | Use of ICT | 55.739 | 16 | 0.000 | Accepted |

Interpretation: With respect to H5a i.e. influence of education on soil testing the calculated chi square value is less than the table value and also the significance is 0.177 which is higher than the 0.05 and hence the null hypothesis is accepted and the alternate hypothesis is rejected. With respect to H5b i.e. influence of education on application of fertilizers through systematic planning, the calculated chi square value is less than the table value and also the significance is 0.124 which is higher than the 0.05 and hence the null hypothesis is accepted and the alternate hypothesis is rejected. With respect to H5c i.e. influence of education on use of ICT, the calculated chi square value is less than the table value and also the significance is 0.254 which is higher than the 0.05 and hence the null hypothesis is accepted and the alternate hypothesis is rejected. With respect to H5d i.e. influence of number of years of experience on soil testing the calculated chi square value is less than the table value and also the significance is 0.189 which is higher than the 0.05 and hence the null hypothesis is accepted and the alternate hypothesis is rejected. With

respect to H5e i.e. influence of number of years of experience on application of fertilizers through systematic planning the calculated chi square value is less than the table value and also the significance is 0.071 which is higher than the 0.05 and hence the null hypothesis is accepted and the alternate hypothesis is rejected. With respect to H5f i.e. influence of number of years of experience on use of ICT the calculated chi square value is greater than the table value and also the significance is 0.000 which is lower than the 0.05 and hence the null hypothesis is rejected accepted and the alternate hypothesis is accepted.

Findings: Education has no influence on either soil testing or application of fertilizers through systematic planning or use of ICT. Number of years of experience has no influence on soil testing and application of fertilizers through systematic planning. Only in the case of use of ICT (information and Communication technology) number of years of experience has an influence on it. It appears that the demographic factors like education and number of years of experience have no influence on adoption of new technology. It is the culture which is influencing the adoption of new technology.

*Hypothesis 6-Purpose of the hypothesis*

During the statistical testing the influence of the independent variable on the dependent variable needs to be tested. Such analysis will help understand the relationships between variables. Government wishes to support farmer through the policy of Minimum Support Price (MSP). To check whether the Government policy of MSP adequately helps the farmer in getting the better price for his produce Chi Square test is used to check the relationship between these important variables.

**Hypothesis H6**

Government policy of MSP (Minimum Support Price) adequately helps getting better price for the produce.

H6a: MSP helps get better price for food grains.

H6b: MSP helps to get better price for commercial crops.

Table 4.77 (Government Policy - MSP - Better price realization - Chi-Square Test)

| Govt. policy | Hypothesis | Crop | Chi-Square value | df | Sig. | Result |
|---|---|---|---|---|---|---|
| MSP | H6a | Food grains | 22.210 | 9 | 0.008 | Accepted |
| | H6b | Commercial crops | 11.898 | 9 | 0.219 | Rejected |

Interpretation: As far as H6a is concerned the calculated Chi Square value is greater than the table value and also the significance is less than 0.005 and hence the hypothesis is accepted. In case of H6b the calculated chi square value is lesser than the table value and also the significance is more than 0.05 and hence the null hypothesis is accepted and alternate hypothesis rejected.

Findings: Government policy of MSP influences and helps the farmer get better price for food grains. But in case of commercial crops the MSP is not influencing and is not helping the farmer get better price.

### 4.3.7 Regression Analysis

In multiple regression, a linear composite of explanatory variables is formed in such a way that it has maximum correlation with a criterion variable. This technique is appropriate when the researcher has a single metric criterion variable which is supposed to be a function of other explanatory variables. The main objective in using this regression technique is to predict the variability the dependent variable based on its covariance with all the independent variable. One can predict the level of the phenomenon through multiple regression analysis model, given the levels of independent variables.

In this case, the independent variables are the Factors of Management of value chain viz. Technology Management, Production management, Infra structure Management and Marketing Management. The criterion variable is the yield or level of production. A regression analysis using these phenomenon variables and the criterion variable is done and the correlation coefficient and the regression value is arrived at to check the predictability.

Table 4.78 (Regression Factors of Management - Yield - Variables Entered)

| **Variables Entered/ Removed[a]** | | | |
|---|---|---|---|
| Model | Variables Entered | Variables Removed | Method |
| 1 | MARKETINGMANAGEMENT, PRODUCTIONMANAGEMENT, INFRASTRUCTUREMANAGEMENT, TECHNOLOGY MANAGEMENT[b] | . | Enter |
| a. Dependent Variable: Level_of_Production | | | |
| b. All requested variables entered. | | | |

Table 4.79 (Regression $R^2$ Value)

| **Model Summary** | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .741[a] | .549 | .547 | .870 |
| a. Predictors: (Constant), MARKETINGMANAGEMENT, PRODUCTIONMANAGEMENT, INFRASTRUCTUREMANAGEMENT, TECHNOLOGYMANAGEMENT | | | | |

Table 4.80 (Regression Significance)

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 618.949 | 4 | 154.737 | 204.524 | .000[b] |
| | Residual | 507.660 | 671 | .757 | | |
| | Total | 1126.609 | 675 | | | |
| a. Dependent Variable: Level_of_Production | | | | | | |
| b. Predictors: (Constant), MARKETINGMANAGEMENT, PRODUCTIONMANAGEMENT, INFRASTRUCTUREMANAGEMENT, TECHNOLOGYMANAGEMENT | | | | | | |

Table 4.81 (Regression Co-efficients)

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -3.047 | .311 | | -9.796 | .000 |
| | TECHNOLOGY MANAGEMENT | .996 | .047 | .618 | 21.014 | .000 |
| | PRODUCTION MANAGEMENT | .764 | .090 | .235 | 8.488 | .000 |
| | INFRASTRUCTURE MANAGEMENT | .139 | .046 | .085 | 3.021 | .003 |
| | MARKETING MANAGEMENT | -.119 | .039 | -.085 | -3.072 | .002 |
| a. Dependent Variable: Level_of_Production | | | | | | |

Interpretation: The correlation coefficient (R - Value) of the phenomenon variables and the criterion variable is 0.741, which means that the correlation is very high. The regression value, R Square is 0.543, which means 54. 3% the criterion variable can be predicted with the phenomenon variables used in the regression model.

Findings: The result of the regression test shows that there is clear predictability between the factors of management of value chain (viz.:Technology Management, Production Management, Infra structure

Management and Marketing Management) and the yield. The yield (criterion variable) can be predicted with good amount of accuracy using the factors of management of value chain (Phenomenon variables).

# CHAPTER - V
# FINDINGS, CONCLUSIONS AND SUGGESTIONS

## 5.1 Findings

- Of the respondents surveyed, only 1% are less than 20 year old. 15.4 % of the farmers are between 21 and 30 years old. 28.3% of the farmers are between 31 to 40 years old. 28.6% of the farmers are 41 to 50 years old. 18.6% of the farmers are between 51 and 60 years. Only 8.1% of the farmers are of the age above 60 years.

- A majority of the respondents (69.4%) had not attended the school or had been drop outs with very little formal education.

- Close to half of the farmers (49%) have 3-4 dependents. 34.5% of the farmers have 5-6 dependents. 9.5% of the farmers have above 6 dependents. 56.1% of the respondents have less than six dependants.

- A good 35.9% of the farmers are having more than 20 years of experience in cultivation. 18.3 % of the farmers are having 16-20 years of experience while 19.5% of the farmers are having 11-15 years of experience. 18.2% of the farmers are having 6-10 years of experience and only 8% of the farmers are having 1-5 years of experience. Majority of the farmers (54.2%) have experience of more than 15 years.

- Over 70% of the farmers (own + tenancy) are marginal and small holding less than 2 hectares, which may have a bearing on the management of value chain.

- It is observed that the vast majority of over 80% are marginal and small farmers having less than two hectares of wet land or dry land.

- 40.5% of the farmers are raising food grains, 9.2% of the farmers are raising commercial crops, 1.3% of the farmers are raising horticultural crops. And Close to half of the farmers (49%) are raising more than one crop.

- At aggregate level, across all the three regions 28.6% depend on canal water, 47.2% depend on bore wells and 14.5% depend on a combination of canal and bore well water. The most striking is that 90.2% of the farmers in Karimnagar district depend on bore well water.

- It is observed that 511 of the 676 respondents do not own any of the farm equipment including bullocks and ploughs.

- Almost all the farmers are using the hiring model as far as farm equipment is concerned. The analysis of the data on hiring farm equipment indicates that the farmers are choosing the hiring model rather than owning them.

- 94.2% of the farmers are not getting their soil tested. At the very first and critical step of soil testing, the farmers are not managing this part of the value chain well.

- It is observed that 66-85% of the farmers irrespective of their age are not getting their soil tested. Irrespective of the age bracket, the farmers are not getting their soil tested.

- In all the categories of level of formal education, over 90 % of them are not getting their soil tested which is very important in the value chain. The analysis indicates that irrespective of the level of education, the farmers are not getting their soil tested.

- Over 95% of the respondents, irrespective of their years of experience in agriculture are not getting their soil tested.

- Soil testing is the first important activity which helps the farmers to understand the fertility levels of their soil and apply fertilizers based on the soil need. It appears that the farmers irrespective of their age or education or years of experience are only following their traditional methods rather than adopt the new technology with respect to the soil testing.

- It is observed from the data that 89.6% of the farmers have not been applying fertilizers based on systematic planning which may lead to sub optimal yields.

- The data suggests that the farmers irrespective of their educational qualification are not applying fertilizers based on systematic planning and there by not managing the value chain well.

- The analysis indicates that the farmers whether educated or not, having experience or not, are not applying fertilizers based on systematic planning and are not able to manage the value chain to maximize the yields.

- On the whole, at the aggregate level, only half the farmers across all three regions are able to manage to receive the inputs in time and the balance half received in time only some times. In this aspect of receipt of inputs in time, farmers of Karimnagar district are able to manage the value chain better than the farmers of Kurnool district and farmers of Kurnool district are able to manage the value chain better than the Guntur farmers. Farmers of Guntur district are at the lowest among three regions in terms of receiving inputs in time for the operations.

- With respect to procuring quality inputs, farmers in Kurnool district are able to manage their value chain better than farmers in Karimnagar district and farmers in Karimnagar district are able to manage better the value chain better than the farmers in Guntur district. The lowest is the Guntur district with respect to receiving quality inputs which is very crucial for maximizing the yields.

- The response from the farmers from all the three regions are the same that the costs of inputs are rising faster than the prices of output. 95.6% of the farmers in Guntur district, 96% of the farmers in Karimnagar district and 96.5% of the farmers in Kurnool district have categorically stated that the costs of inputs are rising faster than the prices of output. Management of value chain in agriculture by the farmers across all the three regions is severely constrained by weaknesses at the industry level.

- Across all the three regions, at aggregate level, 96.7% of the respondents agreed that the power supply is made available to them for sufficient time.

- Across all the three regions at aggregate level, the power is supplied at required voltage, which is a good facilitator in the value chain.

- 59.6% of the farmers in Guntur district use canal water for their irrigation and only 14.2% of them use bore wells. A good quarter of them (25.3%) use a combination of canal water and bore wells. Quite contrast is the farmers in Karimnagar district. 90.2% of them depend on bore wells for their irrigation. In Kurnool district 37.2% of the farmers depend on bore wells and 24.3% of them depend on canal irrigation and 16.8% of the use a combination of canal water and bore wells. Each of the sources of irrigation has its unique challenges of managing irrigation. In Karimnagar district the farmers need to depend on the power supply along with the costs of digging bore wells and the ground water level in their area.

Managing the bore well is more complex. To that extent Karimnagar district farmers face more constraints to manage the irrigation part of value chain in agriculture.

- Across all the three regions at aggregate level, only 56.9% of the farmers agreed with the sufficiency of water for irrigation. The sufficiency of irrigation appears to be influenced by the source of irrigation, which is that the farmers depending on bore well irrigation are facing more constraints in managing the irrigation part of value chain.

- At aggregate level across all the three regions, only 59.4% of the farmers accept that the rural road connectivity is good. The farmers in Kurnool district face serious constraint to manage the transportation costs in the value chain followed by Kurnool district farmers.

- Both in Karimnagar (91.5 %) and Kurnool (82.3%) districts, the farmers opined that the suitable farm machinery is introduced/ available. Guntur district appears to be lagging behind both Karimnagar and Kurnool district farmers with only 63.1 % of the farmers of that district agreeing that suitable farm machines are introduced and available. Of the three districts, Guntur district farmers may face serious constraint in managing their value chain from farm machinery stand point.

- Karimnagar stands out best in terms of the suitability of the introduced farm machinery to the marginal and small farmers with 91.1% of the farmers endorsing it, followed by Kurnool district farmers ( 69.1%) endorsing the same. Guntur district lags behind with only 53.7% of the farmers agreeing to the suitability of the introduced farm machinery to the marginal and small farmers. Guntur district farmers may face serious maximum constraints in managing their value chain from farm machinery stand point with respect to marginal and small farmers.

- Kurnool district farmers are the lowest in awareness levels of latest farming technologies with 90.2% of the farmers claiming unawareness. 60.5% of the farmers in Guntur district are not aware of the latest farming technology and 51.6% of the farmers in Karimnagar farmers are not aware. Kurnool farmers face the serious constraint in managing their value chain.

- 52.2%, 85.3% and 52.2% of the farmers from Guntur, Karimnagar and Kurnool districts respectively are sourcing their crop loans from public finance institutions like commercial banks and cooperative credit societies. Farmers in Karimnagar district are able to manage to source of finance at the lower cost than their counter parts in Guntur and Kurnool districts. 37.8% of the farmers from Guntur district and 26.5% of the farmers from Kurnool district are borrowing from private money lenders and hence are facing serious cost constraints from interest point of view. At aggregate level, across all the three regions 63.9% of the farmers are sourcing their funds from public finance institutions and 24.75 are sourcing from private money lenders. Farmers in Karimnagar district are borrowing the least (10.7%) from private money lenders, may be because they are receiving crop loans in sufficient quantum from public institutions, and therefore are having significant advantage of cost of finance positively affecting the profitability.

- 88.4% of the farmers in Karimnagar district agree that they receive adequate crop loans, while 73.5% of the farmers in Kurnool district receive adequate crop loans and only 52.4% of the farmers in Guntur district receive the crop loans adequately. Among the three regions, Guntur district farmers comparatively may face more constraints than the farmers in other two districts in managing the value chain.

- The highest awareness of the crop insurance is noticed in the Karimnagar district (73.3%). Quite contrasting is the low level of awareness (less than half of the farmers) in Guntur district (47.1%) and in Kurnool district (43.8%). It is clear from the above analysis that the Karimnagar farmers are better placed to manage the insurance part of the value chain better than their counter parts in Guntur and Kurnool districts.

- 94.7% of the Kurnool farmers incurred unforeseen crop losses at some point in time, while 85.8% of the farmers in Karimnagar district incurred unforeseen losses. The lowest losses were recorded in Guntur district with 56.9% of the farmers claiming unforeseen losses at some point in time.

- It is very pathetic to note that 88.5%, 96.5% and 98.2% of the farmers in Guntur, Karimnagar and Kurnool districts respectively hardly received the insurance reimbursement despite suffering unforeseen crop losses. The farmers across the regions are being very severely constrained in managing their insurance part of the value chain. There appears a systemic problem in the agricultural insurance sector.

- Lack of knowledge of agricultural extension officers hampers the farmers' efforts in finding solutions to their farm problems. Extension is a very important link in the value chain which appears not helping farmers much. Only in Guntur district the farmers (72.4%) agree that the agricultural extension officers are knowledgeable. In both the other districts i.e. Karimnagar and Kurnool districts only half of the farmers said that the agricultural extension officers are knowledgeable.

- There are regional differences in the opinion of the farmers about the usefulness of the model farmers. 86% of the farmers in Kurnool district, 70.2% of the farmers in Guntur district opined that the model farmers are not knowledgeable and not useful to them. Only half of the farmers i.e.

51.6 % of the farmers in Karimnagar district said that their model farmers are knowledgeable and useful to them.

- Half of the farmers in Guntur and Karimnagar districts (45.8% each) are aware of the more profitable crop than the one that they are currently raising, which also means that the other half of the farmers do not know. Pathetic is the situation of the farmers in Kurnool district (87.6%) are not aware. It clearly shows that there is a deficiency in the management of value chain, because the crop that they raise is very important in getting them profits. Farmers in Kurnool district are severely constrained on this aspect.

- 92.4%, 89.4% and 70.1% of the farmers in Guntur, Kurnool and Karimnagar districts respectively agree that the labour costs are increasing very high reducing their profitability. The analysis of the data reveals that increasing labour costs are severe constraints in the value chain for the farmers, which has a negative influence on the profitability of the crop raised.

- 79.5% of the food grain farmers in Karimnagar do not prefer to hold the produce to sell at a later date to maximize the price realization.74.6 % of the food grain farmers in Guntur district do not prefer to hold the produce. And 62.3% of the food grain farmers in Kurnool district do not prefer to hold. At the aggregate level across all the three regions, 72.2% of the food grain farmers do not prefer to hold the produce. On the whole, a vast majority of farmers do not intend to hold the produce to sell at a later date when they can get better prices, for various reasons.

- 70.7% of the farmers in Karimnagar district do not prefer to hold the produce (commercial) to sell at a later appropriate time to maximize the price realization. 51.8% of the farmers in Kurnool district also do not

prefer to hold the produce. In Guntur district 43.5% of the farmers do not prefer to hold. At the aggregate level across both the states, 55.3% of the famers do not prefer to hold the produce. The comparative data analysis shows that majority of the commercial crop producers do not intend to hold the produce to sell later. Among the three regions, Karimnagar farmers are facing the significant constraints in managing the value chain in this aspect. Comparing with the food grains farmers (23.2%), commercial crop producers (39.2%) are holding the produce a little better than the food grain farmers.

- 88.1% of the farmers in Kurnool district rated their financial condition from average to very low. 74.6% of the farmers in Guntur district rated their financial condition from average to very low. And 76.9% of the farmers in Karimnagar district rated their financial condition from average to very low. At the aggregate level across all the three regions 83.1% of the farmers rated their financial condition from average to very low. The data shows that across the regions the average to very low financial condition which is a severe constraint.

- 72% of the farmers agreed that they resort to distress sale due to poor financial condition. Only 24.7% of the farmers opined that financial condition is not the reason for distress sale.

- Percentage preferences to hold the produce of food grains by marginal, small, semi medium, medium and large farmers are 8.6%, 15.7%, 28.1%, 39.3%, and 81.8% respectively. Since over 80% of the farmers are marginal and small farmers, their holding capacity is very limited, and they are not able to manage the value chain to their advantage. The above analysis clearly shows that as the land holding size is getting bigger, the food grains farmer is tending towards holding the produce of food grains to sell at a later date.

- In case of commercial crops, the marginal and small farmers (25.0% and 33.3% respectively) are a little bit more tending to hold the produce compared to the food grains farmers (8.6% and 15.7% respectively) . In case of commercial crops also, there is an influence of land holding size on the tendency to hold the produce. Larger the holding size, more the tendency to hold the produce to sell at a later date.

- The data analysis indicates that the dependence on middlemen is less in Karimnagar district (30.2%), while it is quite highest in Kurnool district (97.8%) followed by Guntur district (82.7%). In Karimnagar district 36.9% of the farmers prefer to sell to millers/private agencies directly and 25.3% of them prefer to sell to government agencies.

- 79.6% of the farmers in Kurnool district said that they are receiving low prices due to sale to middlemen. 78.3 % of the farmers in Guntur district said that they are receiving low prices due to sale to middlemen. And 52.4% of the farmers in Karimnagar district said that they are receiving low prices due to sale to middlemen. At the aggregate level across all the three regions 70.1% of the farmers experienced lower prices for their produce due to sale to middlemen. It is clear from the data that selection of buyer has an influence on the prices of the produce, which might be a constraint in the management of value chain.

- 96% of the farmers in Karimnagar district agree that if the levy purchase exists, the prices they get will be better due to competition with the middlemen and other private agencies. 90.7% of the farmers in Kurnool district agree that if the levy purchase exists, the prices they get will be better. While in Guntur district 84% of the farmers agree that if the levy purchase exists, the prices they get will be better. At the aggregate level across the three regions 90.2% of the farmers agree that if the levy

purchase exists, the prices they get will be better. The opinion is uniform across the regions.

- 58% of the farmers in Kurnool district rated the price for their food grains from average to low, while 46.7% of the farmers in Karimnagar district rated the price for their food grains from average to low, and 31.7% of the farmers in Guntur district rated the price for their food grains from average to low.

- At the aggregate level across the three regions 45.2% of the farmers rated the price for their food grains from average to low. On the whole, about half the farmers are of the opinion that the prices they get for their produce is low to average.

- 94.3% of the farmers in Kurnool district rated the prices for their commercial crop produce from average to low, while 80.9% of the farmers in Karimnagar district rated the prices for their commercial crop produce from average to low, and 64% of the farmers in Guntur district rated the prices for their commercial crop produce from average to low. At the aggregate level across the three regions 79.7% of the farmers rated the prices for their commercial crop produce from average to low. The farmers across the three regions are facing constraints in receiving better prices for their commercial produce and hence are not able to manage their value chain well. The price realization for commercial crop farmers appears to be worse off than the food grain farmers.

- The data analysis shows that 65.8% of the farmers in Guntur district, 64% of the farmers in Karimnagar district and 62.3% of the farmers in Kurnool district rate their price realization for their horticultural produce from average to low. At aggregate level across both the states 64.1% of the farmers rated the prices from average to low. Majority of the farmers are

receiving average to low prices for their horticultural produce, which is a constraint in the management of value chain.

- 96.8% of the farmers in Karimnagar district, 92.1% of the farmers in Kurnool district agree that they are receiving low prices for their horticultural produce due to perishability. The situation in Guntur district is slightly better with 67.1% of the farmers claiming low prices for their horticultural produce. At the aggregate level across the three regions 85.3% of the farmers agreed that they are receiving low prices for their horticultural produce due to perishability. Lack of support from the related supporting agencies may be weakening the value chain.

- In Kurnool district 61.5% of farmers opined that market yards are not adequate, while in Karimnagar district about half of the farmers (45.3%) felt that the market yards are not adequate. Similarly, in Guntur district 46.2% of the farmers opined that the market yards are inadequate. The next logical question arises about the usefulness of the market yards in getting better price realization. Answers for the same are elicited in the next question. At aggregate level across regions 51% of the farmers said that the existing market yards are not adequate. While 42.9% of the farmers admitted that the existing market yards are adequate to meet the requirements. The opinion is quite divided.

- 91.6% of the farmers in Karimnagar district, the highest among three districts opined that the middlemen and market yard officials are responsible for low price realization of their produce. 72.9% of the farmers in Guntur district expressed the same opinion. Among the three districts, Kurnool district farmers (61.7%) felt that middlemen and market yard officials are responsible for the low price realization. At aggregate level across regions 75.4% of the farmers expressed their opinion that the middlemen and market yard officials are responsible for the low price

realizations. Among the three regions, Karimnagar farmers are facing the most severe constraints in realizing better prices at the market yards.

- The Karimnagar farmers (63.6%) and Kurnool farmers (54.4%) and Guntur farmers (49.3%) opined that the warehouses availability in their region is low to very low. If the availability of the warehouses is low, farmers will not be able to store their produce to sell at an appropriate time to get better price realization.

- 88.4% of the farmers in Karimnagar district opined that there exists a knowledge gap between research organizations, agricultural officers and the farmers, very closely followed by Kurnool district farmers with 82.7%. In Guntur district 67.5% of the farmers felt that there is knowledge gap. At aggregate level across regions 79.6% of the farmers experienced the knowledge gap. Both Karimnagar and Kurnool district farmers face the severe constraints in the knowledge aspect.

- 97.8% of the farmers in Karimnagar district agree that if the information and communication technology is used, the yields would improve. 80.5% of the farmers in Kurnool district and 64.4% of the farmers in Guntur district expressed the same opinion. At aggregate level across regions, 80.9% of the farmers said that if they use, information and communication technology, the yields would improve.

- Karimnagar district farmers appear to be better in usage of information and communication technology compared to their counter parts in Guntur and Kurnool districts. At least half of the farmers in Karimnagar district are sometimes using information and communication technology, while in Kurnool district the least usage is there. In Guntur district a quarter of the farmers are sometimes using it. Information and communication technology is gaining currency fast to manage the value chain agriculture,

in which Karimnagar farmers appear to be ahead of their counter parts in other districts.

- 86.3 % of the farmers in Kurnool district, 80% in Karimnagar district, and 60.4% of the farmers in Guntur district had expressed their opinion that if agri-processing units are established in their area, they would get better prices for their produce. At aggregate level across regions, 75.6% of the farmers expressed the same opinion.

- 97.8% of the farmers in Kurnool district did not get any benefit from the agri-processing units established near their area. The situation in the other two districts is a little better with 43.1% farmers in Karimnagar district and 37.3% of the farmers in Guntur district did receive better prices, though some times. Inspite of the establishment of agri-processing units near their area, the farmers did not get much benefit from them-especially the Kurnool district farmers.

- 74.8%, 69.8%, 68% of the farmers in Kurnool, Karimnagar and Guntur districts respectively opined that if the exports take place, their produce prices would improve. At aggregate level, across regions, 70.9% of the farmers expressed the same opinion. By and large the opinion is quite uniform across all the three regions. A vast majority of the respondents opined that the prices of agricultural produce would improve with exports taking place.

- 98.2% of the farmers in Kurnool district, 91.1% of the farmers in Karimnagar district have shared their opinion that they were seldom involved in the export process. But in Guntur district, the situation is a bit better, with only 65.3% of the farmers saying that they were not involved. The data analysis shows that the farmers who grow the crops and whose

product is exported are not being involved in the export process whether it is for quality maintenance or grading and packaging aspects.

- 34.1% of the farmers in Kurnool district expressed their opinion that they indeed got better prices always from the exports. In the same district 15.5% of the farmers opined that they got the benefit some times. In Karimnagar and Guntur districts 52% and 48.4% respectively got the benefit sometimes only. At the aggregate level across both the states, 13.2% got the benefit always, 38.6% got the benefit some times. The analysis shows that the exports and the increasing price benefits from them are not reaching the farmers fully.

- There is significant difference among the farmers of the three regions (Telangana, Rayalaseema and Coastal Andhra Pradesh ) with respect to the Technology Management, Production management, Infra Structure Management and Marketing Management.

- There is significant difference among the farmers growing different crops with respect to the Technology Management, Production management, Infra Structure Management and Marketing Management.

- There is no significant difference among marginal, small, semi medium, medium and large farmers with respect to the Technology Management, Production management, Infra Structure Management. But with respect to Marketing Management there are is significant difference among the farmers holding different sizes of land holding.

- Technology Management has an influence on yield. Similarly Infrastructure management has an influence on yield. But the aberration is the Production management, which appears not to have an influence on

yield, which is not understandable. There may be other factors beyond production management influencing yield.

- Demographic factors viz. education and years of experience have no influence on adoption of technology management like soil testing, or application of fertilizers by systematic planning or use of Information and communication technology. (The only exception is experienced farmers tending to use ICT). It appears that they are culture driven in this aspect of value chain.

- Government policy especially MSP (minimum support price) is adequately supporting farmers of food grains but not of commercial crops to get better price for their produce.

- The result of the regression test shows that there is clear predictability between the factors of management of value chain (viz. Technology Management, Production Management, Infra structure Management and Marketing Management) and the yield. The yield (criterion variable) can be predicted with good amount of accuracy using the factors of management of value chain (Phenomenon variables).

- In terms of ranking of the factors, Production management ranks first followed in descending order by Infrastructure, Marketing and Technology Managements.

- In terms of regions managing overall value chain, Telangana ranks first followed in descending order by Rayalaseema and Coastal Andhra Pradesh.

- In terms of ranking regions from Technology management perspective Telangana ranks first followed in descending order by Coastal Andhra Pradesh and Rayalaseema.

- In terms of ranking regions from Production management perspective, again Telangana Ranks first followed in descending order by Rayalaseema and Coastal Andhra.

- In terms of ranking regions from infrastructure management perspective, Coastal Andhra ranks first followed in descending order by Telangana and Rayalaseema.

- In terms of ranking regions from marketing perspective, Rayalaseema leads the group followed by Coastal Andhra and Telangana.

## 5.2 Conclusions

- With respect to Technology Management part of value chain farmers in combined Andhra Pradesh are not adopting new technology. The reasons for it are multiple. Firstly, they prefer to follow the traditional and conventional methods rather than finding out new technologies and try to experiment them. Example for this is that they are not getting their soil tested for fertility and are not applying fertilizers based on systematic planning. Applying fertilizers based on systematic planning is very crucial in maximizing the yields and minimizing the costs. Secondly, there are knowledge and information gaps between the sources viz. agricultural organizations, State Agricultural Universities and the farmer community. The extension officers and model farmers are not fully knowledgeable to advise the farmers on the new production techniques. Thirdly, marginal and small farmers constitute over 80% of the total farmer population and the traditional and conventional mechanization and machinery is not fully suitable to them whose land holding is less than two hectares. Fourthly, the Information and Communication Technology has not penetrated to the farmer level making it difficult to transfer the technologies developed to the farmers.

- With respect to the Production Management part of value chain, the farmers are able to manage well except in some areas. In procuring the quality inputs like seeds, fertilizers and pesticides, about half of the farmers are facing difficulties in procuring the best quality inputs. Farmers are facing severe constraints in terms of increasing costs of labour which is an important input in production. Lack of machines particularly suitable to marginal and small farmers is a severe constraint in production.

- With respect to Infrastructure Management part of value chain, though the farmers are getting good support from the government in terms of provision of infrastructure viz. power, irrigation, rural road connectivity,

Telangana farmers are facing more constraints in irrigation because they are depending on bore wells for irrigation. Since over 80% of the farmers are marginal and small farmers, they are facing severe constraints. When it comes to marketing infrastructure viz. market yards, ware houses and cold storages, the farmers have access to them. But there are system delivery deficiencies which are severe constraints for the farmers. The farmers are not able to take support from those marketing infrastructural facilities in maximizing their value chain.

- With respect to Marketing Management part of value chain, the farmers are severely constrained by their land holding sizes. Over 80% being marginal and small, their agricultural produce is small in quantity and financially being poor, they are compelled to resort to distress sales of their produce. They are not able to hold the produce and sell at a later date to maximize the price realization.

- With respect to Financial Management part of value chain, the farmers are getting adequate crop loans from the formal public institutions (though some are borrowing from private money lenders). But with respect to risk management, the farmers are severely constrained due to lack of awareness as well as system failure of the insurance companies. The insurance companies are only offering insurance products based on blocks/ mandals rather than individual farmers. Farmers are not getting support from the insurance aspect to mitigate their crop losses if any, due to unforeseen circumstances.

- With respect to agri-processing units and exports are concerned, the farmers are not getting adequate benefit in realizing better prices for their produce whenever exports happen or wherever the agri-processing units are established. Farmers are not being engaged in the process of exports or agri-processing units, though the agricultural produce is the input for them.

- With respect to the government policy like Minimum Support Price (MSP) is concerned, food grain farmers are getting adequate support, but not the commercial crop producers.

- Though food grain production at macro level appears to be satisfactory, the yields in India are very less compared to some of the agriculturally advance countries like China, USA, Egypt, Israel, France etc.

- There are differences in management practices of farmers in the three regions viz. Telangana, Rayalaseema and Coastal Andhra Pradesh, and also among farmers growing food grains, commercial crops and horticultural crops.

- With respect to farmers of different land holding size viz. marginal, small, semi-medium, medium and large, there are no differences in Technology Management, Production Management and Infrastructure Management, but there are differences in marketing management due to their small holdings and poor financial conditions.

- The summary conclusion is that the farmers are quite vulnerable on one hand from the vagaries of monsoon and on the other hand from the support from other agencies. There are some factors of value chain that the farmer has control viz. Production (Inbound Logistics and Operations in the Michael Porter`s Value Chain) and is managing to the best of his ability. And there are other factors of value chain Viz. Marketing (Outbound Logistics and Marketing and Sales of Michael Porter`s Value Chain), Procurement, Technology, Infrastructure, Labour (Support Activities of Michael Porter's value Chain) for which he depends on the support from other agencies. During the study, all the objectives of the study have been completely met.

## 5.3 Suggestions

### 5.3.1 Suggestions at farmer level

- Farmers need to come forward to learn the latest technologies in agriculture so that they can get better yields and price realizations.

- Farmers need to get their soils tested for both fertility and structure and apply fertilizers based on systematic planning to minimise the costs and maximise the yields.

- Farmers need to go by the quality of inputs in selection rather than credit and price, so that the yields are better.

- Farmers need to use the pledge loans and minimise their distress sales and maximise their price realizations.

- Farmers need to use ICT (Information and Communications Technology) in their value chain to maximise the benefits.

- Farmers need to grow more profitable crops in their farm, provided they are suitable to their soil, rather than follow the cultural habit of selecting crops.

- Farmers need to group themselves and make purchases of inputs collectively to minimise the costs and sell their produce collectively to maximise the price realizations.

### 5.3.2 Suggestions at policy maker level

- The transfer of technology and knowledge needs to be improved for maximizing the value chain of the farmers from the government side.

- Government needs to put in place better quality control mechanisms for inputs and strictly enforce them.

- Agricultural graduates need to be appointed as model farmers in each village and train them periodically so that they can in turn advise the farmers properly.

- Government intervention through MSP and levy needs to be reinforced especially in the commercial crops to support the farmers.

- The processes at market yards need to be strengthened and become more farmers friendly.

- The crop insurance needs to be implemented with farmer as a unit and widely publicized.

- Use of Information and communication technology needs penetration at farmer level and government to take up as a mission.

- Government needs to set up a commission to study the increasing costs of labour and come out with some solutions to the farmers' labour problems.
- Government`s Extension mechanism to be strengthened and increase the reach to the farmers.

- Government needs to engage farmers in exports and agri-processing unit development, so that the farmers are well informed about the variety and quality that they need to produce.

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ANNEXURE - A

**MANAGEMENT OF AGRICULTURE**

**A. PRIMARY INFORMATION OF THE FARMER**
(All letters must be in capitals)

1. Full Name: _____
పూర్తి పేరు

2. Age: వయస్సు _____

3. Education: చదువు

☐ Nil ☐ Primary ☐ Secondary ☐ College ☐ University

ఏమి చదువుకోలేదు ప్రాథమిక సెకండరీ కాలేజ్ యూనివర్సిటీ

4. Family details: No. of Dependents _____

కుటుంబ వివరాలు: ఆధారపడినవారు

5. Telephone: (Land Line) STD Code: _____ No. _____ (Cell) _____

టెలిఫోన్ (ల్యాండ్‌లైన్) ఎస్‌టిడి కోడ్ (సెల్)

6. Village: _____ Pin Code: _____
గ్రామం పిన్ కోడ్

7. Mandal: మండలం_____

8. District: జిల్లా _____

9. State: రాష్ట్రం _____

10. Own farm land (No. of acres): Wet Land _____ Dry Land _____

స్వంత వ్యవసాయ భూమి (ఎకరాల సంఖ్య) తడి భూమి పొడి భూమి

11. Tenancy farm land (No. of acres): Wet Land _____ Dry Land _____

కౌలుకి తీసుకొన్న వ్యవసాయ భూమి (ఎకరాల సంఖ్య) తడి భూమి పొడి భూమి

12. Number of years in cultivation: ఎన్ని సం.లుగా సాగు చేస్తున్నారు

☐ 1- 5 Years ☐ 6--10 Years ☐ 11-15 Years ☐ 16-20 years ☐ Above 20 Years

14. Irrigation under (tick as applicable): దేని క్రింద నీటిపారుదల ఉన్నది (వర్తించినట్లుగా టిక్ చేయండి)

□ Canal □ Bore well □ Canal + Bore well □ Tank

కాలువ బోరుబావి కాలువ+ బోరు బావి (రిజర్వాయర్)

15. Types of crops and their acreage: పంటల రకాలు మరియు వాటి సాగు ఎకరాలు

| **Crop** | **Acreage** | **Crop** | **Acreage** |
|---|---|---|---|
| పంట | ఎకరాలు | పంట | ఎకరాలు |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

16. Owns: స్వంతగా ఉన్నవి

□ Bullocks □ Plough □ Tractor □ Harvester (Combine)

ఎద్దులు నాగలి ట్రాక్టర్ పంట కోసేది (కంబైన్)

17. Hires: అద్దెకు తీసుకొనేవి

□ Bullocks □ Plough □ Tractor □ Harvester (Combine)

ఎద్దులు నాగలి ట్రాక్టర్ పంట కోసేది (కంబైన్)

## B. <u>PRACTICES OF FARMERS IN THE STATE OF ANDHRA PRADESH (COMBINED)</u>

**ఆంధ్ర ప్రదేశ్ (సమిష్టి) రాష్ట్రం రైతు అభిప్రాయాలు**

18. Will you prefer to hold the produce (to sell later), if you have advance information about likely increase in price for food crops like paddy?

ఆహార పంటలు అంటే దాన్యం లాంటి వాటి ధరలు పెరిగే అవకాశం గురించి మీకు ముందస్తు సమాచారం ఉంటే, మీరు పండించిన పంటను ఉంచుకొనుటకు ( తరువాత అమ్మటానికి) ఇష్టపడతారా?

□ Prefer the least □ Not prefer □ Not sure □ Prefer □ Prefer the most

అతి తక్కువగా ఇష్టపడను ఖచ్చితంగా ఇష్టపడతాను అతి ఎక్కువగా ఇష్టపడతాను చెప్పలేను ఇష్టపడతాను

19. Will you prefer to hold the produce (to sell later), if you have advanced information about likely increase in price for commercial crops like turmeric, cotton, tobacco etc?

వాణిజ్య పంటలు అంటే పసుపు, ప్రత్తి, పొగాకు మొ. లాంటి వాటి ధరలు పెరిగే అవకాశం గురించి మీకు ముందస్తు సమాచారం ఉంటే, మీరు పండించిన పంటను ఉంచుకొనుటకు ( తరువాత అమ్మటానికి) ఇష్టపడతారా?

□ Prefer the least □ Not prefer □ Not sure □ Prefer □ Prefer the most

అతి తక్కువగా ఇష్టపడను ఖచ్చితంగా ఇష్టపడతాను అతి ఎక్కువగా ఇష్టపడతాను చెప్పలేను ఇష్టపడతాను

20. How do you describe your financial soundness?

మీరు మీ ఆర్థిక స్థితిని ఎలా వర్ణిస్తారు?

□ Very low □ Low □ Average □ High □ Very High

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

20. Do you agree that tight financial condition is the main reason for selling the produce at the time of harvest only?

ఇబ్బందికరమైన ఆర్థిక పరిస్థితి అనేది పంట కోత సమయంలోనే పండించిన పంటను అమ్మటానికి ప్రధాన కారణం అని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

*21.* Whom do you prefer to sell your produce to? (*Please tick one)*

మీరు పండించిన పంటను మీరు ఎవరికి అమ్ముతారు? (దయచేసి ఒకదానికి టిక్ చేయండి)

□ Middleman □ Miller/ Pvt. Company □ Govt. agency

మధ్యవర్తి మిల్లర్/ ప్రైవేటు కంపెనీ ప్రభుత్వ సంస్థ

22. Do you agree that sale to middlemen always gets you the lower price realization?

మధ్యవర్తికి అమ్మటం వలన వాస్తవంగా మీకు ఎల్లప్పుడూ తక్కువ ధర వస్తుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

23. Do you agree that existence of Levy (Minimum Support Price) purchase helps you realize better price? (Because of competition)

లెవీ (కనీస మద్ధతు ధర) కొనుగోలు ఉండుట వలన మీకు మంచి ధర రావటానికి సహాయపడుతుందని మీరు అంగీకరిస్తారా? ( పోటీ కారణంగా)

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

24. How do you rate the price realization for your crop (only cereals) during the current year?

ప్రస్తుత సంవత్సరంలో మీ పంట ( కేవలం సిరల్స్) కు వచ్చే ధరను మీరు ఎలా రేటింగ్ ఇస్తారు?

□ Very low □ Low □ Average □ High □ Very high

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

26. How do you rate the price realization for your crop (only commercial crops) during the current year?

ప్రస్తుత సంవత్సరంలో మీ పంట ( కేవలం వాణిజ్య పంటలు) కి ధర స్థిరీకరణకు ఎలా రేటింగ్ ఇస్తారు?

□ Very low □ Low □ Average □ High □ Very high

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

27. How do you rate the price realization for your crop (only Fruits and vegetables) during the current year?

ప్రస్తుత సంవత్సరంలో మీ పంటకు ( కేవలం పండ్లు మరియు కూరగాయలకు) ధర స్థిరీకరణకు మీరు ఎలా రేటింగ్ ఇస్తారు?

□ Very low □ Low □ Average □ High □ Very high

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

28. Do you agree that perishability is the main reason (for fruits and vegetables) for realizing lower price?

తక్కువ ధర రావటానికి (పండ్లు మరియు కూరగాయలు) ఎక్కువ కాలం నిల్వ ఉండకపోవుటకు ప్రధాన కారణం అని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

29. Do you agree that you are receiving the electricity supply for required time?

మీకు కావల్సిన సమయంకు విద్యుత్ అందుతుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

30. Do you agree that you are receiving electricity supply in required voltage?

కావల్సిన వోల్టేజ్‌లో మీకు విద్యుత్ సరఫరా అందుతుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

31. Do you agree that your crop production could be better if irrigation supply to your farm is better?

మీ పొలానికి నీటి సరఫరా బాగుంటే మీ పంట ఉత్పాదన మెరుగుపడవచ్చని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

32. Do you agree that the irrigation supply is good to your farm?

మీ పొలానికి నీటిపారుదల సరఫరా బాగుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

33. How do you rate you the level of production of your crop this year?

ఈ సంవత్సరం మీ పంట యొక్క ఉత్పాదన స్థాయికి మీరు ఎలా రేటింగ్ ఇస్తారు?

□ Very low □ Low □ Average □ High □ Very high

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

34. Do you agree that the existing market yards are adequate to serve all farmers?

ప్రస్తుత మార్కెట్ యార్డ్‌లు రైతులందరికీ సేవలందించుటకు సరిపోను ఉన్నాయని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

35. Do you agree that the middlemen and market yard officials are causing you realize lower prices for your produce?

మీరు పండించే వాటికి తక్కువ ధరలు రావటానికి మధ్యవర్త మరియు మార్కెట్ యార్డ్ అధికారులు కారణం అని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

36. Do you agree that roads and rural connectivity in your area is good and reducing your transportation costs?

మీ ప్రాంతంలో రహదార్లు మరియు గ్రామీణ కనెక్టివిటీ/ సంబంధాలు బాగున్నాయి మరియు మీ రవాణా ఖర్చులు తగ్గిస్తున్నాయని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

37. How is the availability of ware houses facility in your area that helps you store your produce and fetch a higher price when sold at right time?

మీరు మీ పంటలను నిల్వ చేసుకొని సరైన సమయంలో అమ్మినప్పుడు అధిక ధర పొందేలా సహాయపడేందుకు మీ ప్రాంతంలో వేర్ హౌస్‌ల సదుపాయం ఎంతగా లభిస్తుంది?

□ Very low □ Low □ Average □ High □ Very high

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

38. Do you agree that there is a gap of knowledge and information between research organizations and farmers leading to lower productivity?

అధ్యయన సంస్థలు మరియు రైతుల మధ్య పరిజ్ఞానం మరియు సమాచారం విషయంలో అంతరం వలన తక్కువ ఉత్పాదనకు దారితీస్తుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

39. Are you fully aware of the latest developments in farming technology to increase your production?

మీ పంట ఉత్పాదనను పెంచుటకు సాగు టెక్నాలజీలో సరికొత్త మార్పులు మీకు పూర్తిగా తెలుసునా?

□ Not at all aware □ Not aware □ Unsure □ Aware □ Fully aware

అస్సలు తెలియదు తెలియదు ఖచ్చితంగా చెప్పలేను తెలుసు పూర్తిగా తెలుసు

40. Do you agree that the latest farming technologies are reaching the farmers to increase productivity?

ఉత్పాదన పెంచుటకు సరికొత్త సాగు పద్ధుతులు రైతులను చేరుతున్నాయని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

41. Do you agree that the latest farming technologies are suitable to small and marginal farmers?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

42. Do you agree that the "Model Farmers" in your village are knowledgeable to advise you correctly?

మీ గ్రామంలో ''ఆదర్శ రైతులు'' మీకు సరిగ్గా సలహా ఇవ్వటానికి తగ్గ పరిజ్ఞానం కలవారని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

43. Do you agree that the current agricultural extension officers are knowledgeable to advise you correctly on fertilizers, plant protection and other agricultural practices for higher productivity?

అధిక ఉత్పాదన కోసం ఎరువులు, మొక్క రక్షణ మరియు ఇతర వ్యవసాయ పద్ధతులపై ప్రస్తుత వ్యవసాయ ఎక్స్‌టెన్షన్ అధికారులు తగిన పరిజ్ఞానం కలవారని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

44. Are you aware of more profitable crop that can be raised in your soil than the one you are raising?

మీరు పండిస్తున్న దాని కంటే మీ భూమిలో పెంచదగిన మరింత లాభదాయకమైన పంట మీకు తెలుసునా?

□ Not at all aware □ Not aware □ Unsure □ Aware □ Fully aware

అస్సలు తెలియదు తెలియదు ఖచ్చితంగా చెప్పలేను తెలుసు పూర్తిగా తెలుసు

45. From whom are you taking the crop loan? (Please tick the right one)

మీరు ఎవరి నుండి పంట ఋణం /అప్పుని తీసుకొంటున్నారు? (సరైనది దయచేసి టిక్ చేయండి)

□ Coop credit society □ Comml bank □ Private money lenders □ family members

సహకార ఋణ సంఘం కమ్యూనల్ బ్యాంక్ ప్రైవేట్ వడ్డీ వ్యాపారులు కుటుంబ సభ్యులు

46. How do you describe the interest rate you are paying?

మీరు చెల్లిస్తున్న వడ్డీ రేటుని మీరు ఎలా వర్ణిస్తారు?

□ Very low □ Low □ Average □ High □ Very high

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

47. How do you rate the profitability you are getting on your crop?

మీ పంటపై మీకు వస్తున్న లాభమునకు మీరు ఎలా రేటింగ్ ఇస్తారు?

□ Very low □ Low □ Average □ High □ Very high

బాగా తక్కువ తక్కువ మధ్యస్థం ఎక్కువ బాగా ఎక్కువ

48. Do you agree that you are receiving adequate crop loan for the intended purpose?

కావాలనుకొన్న అవసరమునకు సమయానికి బాగా పంట లోన్ అందుతుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

49. Are you aware of the crop insurance to mitigate the unforeseen crop losses?

అనుకోని పంట నష్టాలను పంట భీమా తీర్చగలదని మీకు తెలుసునా?

□ Not at all aware □ Not aware □ Unsure □ Aware □ Fully aware

అస్సలు తెలియదు తెలియదు ఖచ్చితంగా చెప్పలేను తెలుసు పూర్తిగా తెలుసు

50. Do you agree that you incurred crop losses (after having done crop insurance) due to unforeseen circumstances?

అనుకోని పరిస్థితుల కారణంగా (పంట భీమా చేసిన తరువాత) మీకు పంట నష్టాలు జరిగినాయని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

51. Has crop insurance helped you in the past to mitigate the unforeseen crop losses?

పంట భీమా మీకు అనుకోని పంట నష్టాలను తట్టుకొనుటకు గతంలో మీకు సహాయపడినదా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

52. Are you getting seeds, fertilizers and pesticides in time to increase production?

దిగుబడిని పెంచుటకు సకాలంలో మీకు విత్తనాలు, ఎరువులు మరియు పురుగుమందులు వస్తున్నాయా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

53. Are you getting quality seeds, fertilizers and pesticides to increase production?

దిగుబడిని పెంచుటకు మీకు నాణ్యమైన విత్తనాలు, ఎరువులు మరియు పురుగుమందులు మీకు లభిస్తున్నాయా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

54. Do you agree that inputs costs have gone up disproportionately higher than the price of produce?

ఉత్పత్తి యొక్క ధర కంటే సాగులో వాడే ఉత్పత్తుల యొక్క ధరలు/ ఖర్చులు బాగా పెరిగాయని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

55. Did you ever get your soil tested to know the fertility of your soil?

మీ భూసారమును తెలుసుకొనుటకు మీరు ఎప్పుడైనా మీ భూమిని పరీక్ష చేసినారా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

56. Do you apply fertilizers to your land based on scientific study for higher productivity?

మీరు అధిక ఉత్పాదనకు సైంటిఫిక్ అధ్యయన ఆధారంగా మీ భూమిలో ఎరువులు వేస్తారా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

57. Do you agree that using Information and Communication Technology helps increase agricultural production?

సమాచార మరియు కమ్యూనికేషన్ టెక్నాలజీ వాడుట వ్యవసాయ ఉత్పాదన పెంచుతుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

58. Do you use Information and Communication Technology that helps increase agricultural production?

వ్యవసాయ ఉత్పాదన పెంచుటలో సహాయపడే సమాచార మరియు కమ్యూనికేషన్ టెక్నాలజీని మీరు వాడుతారా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

59. Do you agree that cost of agricultural labour increased very high reducing the profitability?

బాగా పెరిగిన వ్యవసాయ కూలిల ఖర్చు అనేది లాభాన్ని తగ్గిస్తుందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

60. Do you agree that exports of agricultural produce increases prices locally?

వ్యవసాయ ఉత్పత్తుల ఎగుమతులు స్థానికంగా ధరలను పెంచుతున్నాయని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

61. Are farmers engaged in any form by the agri-exporting agencies for higher price realization?

అధిక ధర స్థిరీకరణకు వ్యవసాయ ఎగుమతి సంస్థలచే ఏదైనా ఫామ్‌లో రైతులు నిమగ్నమై ఉన్నారా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

62. Are you getting higher price for your produce due to export of the subject produce?

ఉత్పత్తి చేసిన వాటిని ఎగుమతి చేసిన కారణంగా మీ పంటకు అధిక ధర వస్తుందా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

63. Do you agree that agri-processing units near your area will get your higher price?

మీ ప్రాంతానికి దగ్గరిలో వ్యవసాయ ప్రోసెసింగ్ యూనిట్స్ మీకు అధిక ధర వచ్చేలా చేస్తాయని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

64. Are you getting higher revenue due to the existence of processing units in your area?

మీ ప్రాంతంలో ప్రోసెసింగ్ యూనిట్స్ ఉండుట వలన మీకు అధిక రెవిన్యూ వస్తుందా?

□ Never □ Rarely □ Unsure □ Sometimes □ Always

ఎన్నడూ లేదు అరుదుగా ఖచ్చితంగా చెప్పలేను కొన్నిసార్లు ఎల్లప్పుడూ

65. Do you agree that suitable mechanization is introduced to reduce the cost of operations?

నిర్వహణ ఖర్చులను తగ్గించుటకు తగిన మెకనైజేషన్ (యాంత్రీకరణ) ప్రవేశపెట్టారని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

66. Do you agree that currently available mechanization is suitable to small and marginal farmers?

చిన్నపాటి మరియు ఒక మోస్తరు రైతులకు ప్రస్తుతం లభించే యాంత్రీకరణ తగినట్లుగా ఉందని మీరు అంగీకరిస్తారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

67. Do you think you are happy doing farming to meet your increasing family educational and medical expenses?

మీరు పెరిగిపోతున్న మీ కుటుంబ విద్యాపరమైన మరియు వైద్య ఖర్చులను తీర్చుకొనుటకు వ్యవసాయం చేయటం సంతోషంగా ఉందని మీరు అనుకుంటున్నారా?

□ Mostly disagree □ Disagree □ Unsure □ Agree □ Mostly agree

ఎక్కువగా అంగీకరించను అంగీకరించను ఖచ్చితంగా చెప్పలేను అంగీకరిస్తాను ఎక్కువగా అంగీకరిస్తాను

**ANNEXURE - B**

## LIST OF PUBLICATIONS

IJAIR/CERT./1583

*The Board of the*

International Journal of Agriculture Innovations & Research (IJAIR)

*Is hereby awarding this certificate to*

"G. Lakshma Reddy"

*In recognition of the publication of the paper entitled*

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