Economics of Turmeric Production in Koraput District of Odisha

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In partial fulfillment of the requirement for the degree of
Master of Science in Agriculture
(Agricultural Economics)

By

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CERTIFICATE – I

This is to certify that the thesis entitled **"Economics of Turmeric Production in Koraput district of Odisha"** submitted in partial fulfillment of the requirement for the award of degree of **MASTER OF SCIENCE IN AGRICULTURE (AGRICULTURAL ECONOMICS)** to the Orissa University of Agriculture and Technology is a faithful record of bonafide and original research work carried out by **Sisu Sankar Nayak** under my guidance and supervision. No part of this thesis has been submitted for any other degree or diploma.

It is further certified that the assistance and help received by him/ her from various sources during the course of investigation has been duly acknowledged.

Dr. A.K. MISHRA
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CERTIFICATE –II

This is to certify that the thesis entitled **"Economics of Turmeric production in Koraput district of Odisha"** submitted by **Sisu Sankar Nayak, Adm. No. 05AE/14** to the Orissa University of Agriculture and Technology, Bhubaneswar in partial fulfilment of the requirement for the degree of **MASTER OF SCIENCE IN AGRICULTURE (AGRICULTURAL ECONOMICS)** has been approved by the students' advisory committee and the external examiner.

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Place- Bhubaneswar

Date: **Sisu Sankar Nayak**

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ABBREVIATIONS

Abbreviations/Symbol	Descriptions
km	Kilometer
sq	Square
^{0}C	Degree Celsius
e.g.	For example
et al.	Co-workers
Fig.	Figure
Hrs.	Hours
B: C ratio	Benefit cost ratio
i.e.	that is
kg	Kilogram
ha.	Hectare
viz.	such as
MT	Million tonnes
Q	Quintals
%	Percentage
Rs.	Rupees
Sl.	Serial
CAGR	Compound Annual Growth Rate
Fig.	Figure
No.	Number
TMO	Technology Mission on Oilseeds
Etc.	et cetera
WHO	World Health Organisation
ICMR	Indian Council of Medical Research

GCA	Grossed Cropped Area
FLDs	Frontline Demonstration
AICRPRM	All India Coordinated Research Project on Rapeseed-Mustard
YIOFP	Yield Increase over farmers Practice
ANMR	Additional Net Monetary Returns
IBCR	Increment Benefit Cost Ratio
MSP	Minimum Support Price
NAC	Notified Area Council
SC	Scheduled Caste
ST	Scheduled Tribe
AAO	Assistant Agriculture Officer
AHO	Assistant Horticulture Officer
DAO	District Agriculture Officer
AEO	Assistant Executive Officer
VAW	Village Agricultural Worker
SHG	Self Help Group

ABSTRACT

The study entitled "Economics of Turmeric Production in Koraput District of Odisha" was undertaken with the objective to estimate the costs involved and return obtained in turmeric cultivation, to estimate resource use efficiency in production, to estimate processing costinvolved at different stages of the product, to examine marketing costs and price spread in different marketing channel and find out major constraints in turmeric production. Both primary and secondary data were collected for the study. Primary data were collected from 60 farmers from irrigated and non-irrigated area which include marginal, small and large farmers as per proportion to the existing population size in each category. Secondary data were collected from Odisha Agricultural Statistics published by Directorate of Agriculture and Food Production Bhubaneswar, AAOs, AHOs and DAO office of Koraput District. Trend in area, production and productivity of turmeric in Koraput district was studied from 2007-2017 using compound Annual Growth Rate (CAGR) where both increase in production and productivity along with area has been studied. Different costs involved in production likeA_1, A_2, B_1, and B_2.and C was estimated along with profitability and production functionYield gap analysis and Cobb-Douglas production function were used to analyze the collected data.The gross income and net income was estimated tobe Rs.2, 82,168 and Rs.1, 14,146respectively and benefit cost is to extent of 1.67 on aggregate level. Area under turmeric (X_1) on all three farm sizes, farm power (X_2) on small and medium farm, seed (X_3) and irrigation (X_5) on large farm etc. are the inputs variables contributed for augmenting productivity.Three channels of marketing were identified for turmeric which are Channel - I Producer - Commission agent cum wholesaler - Distant wholesaler – Export. Channel – II Producer - Commission agent cum wholesaler – Processor- Wholesaler – Retailer –Consumer and Channel - III Producer - Processor - Exporter. Producer share in consumer rupee is high(63.78 per cent) in channel III than channel I and II since the involvement of middlemen in business channel is low where as in channel I it is 47.30 per cent and channel II it is 29.49 per cent. The marketing efficiency index of channel I, II, and III are 0.89, 0.41 and 1.76 respectively indicating superiority of channel III.The important constraints hindering turmeric production are high cost of labour followed by business link with traders. Thus it is suggested that productivity level be in for reduce cost of producing recurred in put be supplied at right time and necessary establishment of processing centers are to be encouraged.

INTRODUCTION

India is called the "Spice Bowl of the World" as it cultivates 63 spices out of total 107 spices identified. Among the spices turmeric is one of the most important and ancient spice of India and also a traditional item of export. It is extensively used in the preparation of tasty curried dishes by all classes of people for its typical colour and flavour.

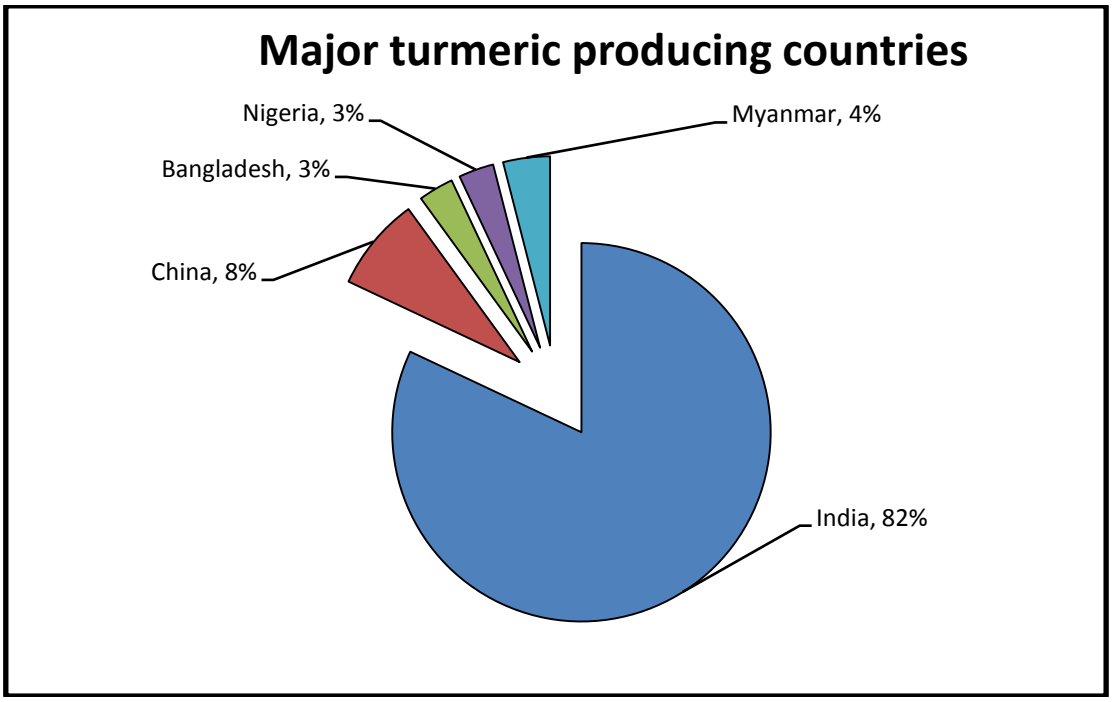
Indian spices have been playing a great role for strengthening the economic conditions since the ancient time period. In this modern and technological world, though the spice trade has increased and the nature has changed, its role and importance still remains the same. The value and demand of Indian spices is not limited to India only, there is a huge demand for Indian spices in foreign countries as well. The spices which are mainly exported from India are Pepper, Ginger, Chilli, Cardamom, Coriander, Dill, Cinnamon, Ajowan, Casia, Cloves, Nutmeg, Mace and Turmeric. Among the exported spices turmeric is having considerable potential for increasing its exports share in the total exports from India.

Spices constitute an important group of agricultural commodities. They can be primarily defined as farm products used in various forms viz; fresh, ripe, dried, broken, powdered etc. Spices may be bark, buds, flowers, fruits, leaves, rhizomes, roots, seeds, stigmas and styles or the entire plant tops.

Turmeric (*Curcuma longa L),* the ancient and sacred spice of india known as 'Indian saron' is an important commercial spice crop grown in India. It is known as the "Golden spice" as well as the "Spice of life". It is one of the most essential spices used as an important ingredient in culinary all over the world. Turmeric is the dried rhizome of *Curcuma longa L.,* an herbaceous perennial belonging to the family and a native of South Asia particularly India. The plant is propagated from rhizomes. The rhizomes are ready for harvesting in about 8 to 10 months after planting.

It is used in diversified forms as a condiment, flavouring and colouring agent and as a principal ingredient in Indian culinary as curry powder. It has anticancer and antiviral properties and hence finds use in the drug industry and cosmetic industry. Curcuma is now gaining importance all over the world as a mighty cure to combat a variety of ailments, as the genus carries molecules credited with anti-inflammatory, hypocholestremic, cholera tic, antimicrobial, anti-rheumatic, anti-fibrotic, anti-venomous, antiviral, anti-diabetic, anti-hepatoxic and anti-cancerous properties as well as insect repellent activity (Chattopadhya *et al*, 2004)

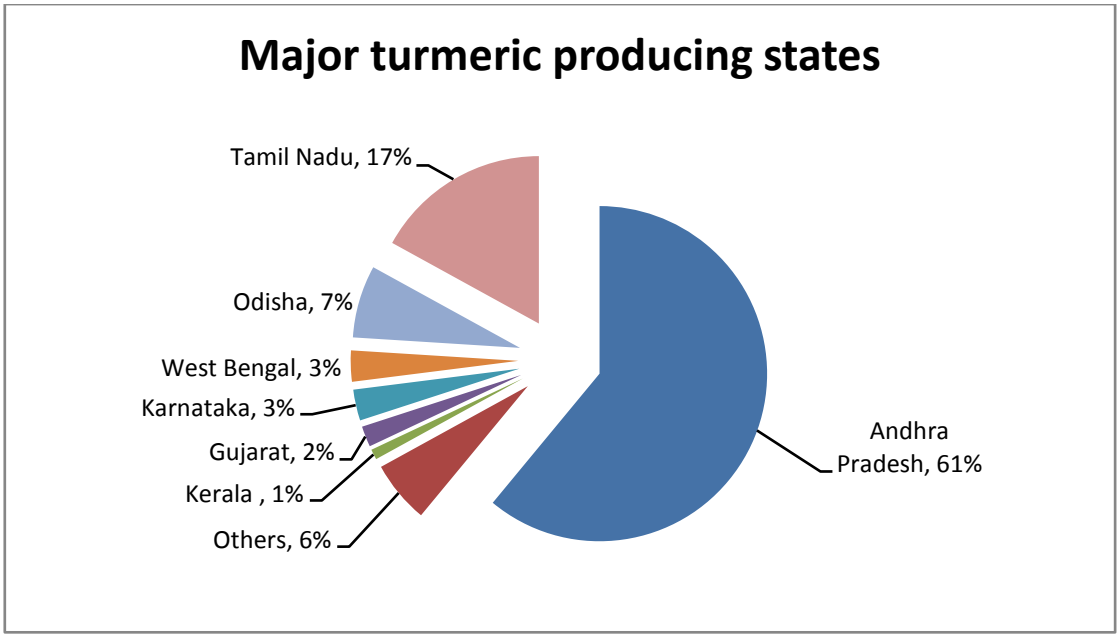
India is the largest producer of turmeric in the world accounting to 82 per cent of world turmeric production and 60 per cent of world export. Other major producers of turmeric are China (8 %), Myanmar(4%), Nigeria(3%), Bangladesh(3%). United Arab Emirates (UAE) is the major importer of Indian turmeric accounting for about 16 per cent of the total exports, followed by United States of America with about 10 per cent. The other leading importers are Bangladesh, Japan, Sri Lanka, UK, Malaysia, South Africa, Netherlands and Saudi Arabia.



Source: APEDA

INDIAN TURMERIC SCENARIO

India is the largest producer and exporter of spices in the world. Turmeric occupies about 6 percent of the total area under spices and condiments in country. During 2014-15, the country produced 846250 tonnes of turmeric from an area of 178470 ha (Spice board). During the period between April 2015 to January 2016, india exported 88500 tonnes of turmeric valued at Rs. 92,165.00 (Lakhs) (DGCI & S., Calcutta/Shipping Bills/ Exporters's Returns). From India's total turmeric exports, 65 percent exported to UAE, USA, Japan, Srilanka,UK and Malaysia.



Sources: www.indiaspices.com

STATE SCENARIO:

In Odisha, turmeric is an important cash crop crop grown by tribal families for their livelihood. Odisha contributes about 21 percent of India's turmeric cultivation in terms of area and Kandhamal makes up for over 50 percent of the state's share. Odisha produced turmeric 59361 tonnes from 24733 ha. Kandhamal district stands first in turmeric area as well as production (26,000mt from 12,710 ha). Koraput is the second largest producing district (7,761 tonnes from 3,168 ha) followed by Nayagarh (5343 tonnes from 2473 ha) and Keonjhar (2937 tonnes from 1224 ha).

OBJECTIVES OF THE STUDY:

1. To estimate the costs involved and return obtained in turmeric cultivation.
2. To estimate resource use productivity and efficiency of turmeric cultivation.
3. To study the processing cost involved in different stages of turmeric.
4. To examine marketing costs and price spread in different marketing channels.

Hypothesis of the study:

The study based on the following hypothesis:

- In turmeric cultivation remunerative returns though cost involved is high.
- Resources in turmeric production are productively utilised with better economic efficiency.
- The Processing cost of different stages of turmeric though more but it also fetches good market price as compared to raw turmeric.
- The marketing cost at different levels are more with good amount of market margin.

Structure of the Thesis

The study is presented in six chapters as follows:

I. Introduction: The importance of the study, scope of study and objectives as well as hypothesis are formulated.

II. Review of literature: The available and relevant literature is thoroughly reviewed on issues pertaining to economic production of turmeric.

III. Methodology: The methods and material encompassing sampling methods, data collection, analytical tools to be used and methods of analysis are discussed.

IV. Results: The results of the study covering the important aspects such as marketing channels, profit margin, price spread, and market efficiency are presented.

V. Discussion: The results obtained are discussed to arrive at a concluding point.

VI. Summary and conclusions: Summary and suggestions for improving the marketing of Turmeric are presented.

Limitations of the study:

The study does not claim it completeness in all aspects. It has some limitations. The study covers only production and marketing aspects of turmeric cultivation in Koraput district of Odisha covering 60 respondents selected from two villages of Nandapur blocks. Thus the results obtained are location specific and applicable to only Koraput districts. The information supplied by selected respondents are based on their recall memories as they does not maintained any farm records. Although, all necessary precautions have been taken in the collection and analysis of micro level data.

REVIEW OF LITERATURE

A literature review is a text of a scholarly paper, which includes the current knowledge including subtantiative findings, as well as theoretical and methodological contributions to a particular topic. Literature reviews are secondary sources, do not report new or original experimental work. Most often associated with academic-oriented literature, such reviews that may also appear in the same publication. In this chapter a review of the available research studies have been presented in chronological order conformity with the objective of the study.

Costs and Returns:

Pol (2001) analyzed the economics of production and marketing of ginger in Satara district. The finding of the study showed that average per hectare total cost of production (cost C) was Rs. 119534.73. The major items of cost of cultivation were seed rhizome, manures and fertilizer, machine labour and Grant total value of land. The average per hectare gross returns and net profit was worked out as Rs. 174755.43 and Rs. 41295.13 respectively. The output-input ratio at total cost was 1.31 i.e greater than one indicating a profitable crop enterprise.

Dodke *et al.* (2002) conducted study on economics of production and marketing of turmeric in Karnataka, the results of the study revealed that total cost 'A' of local variety and improved variety of turmeric cultivation were Rs. 21,791 and Rs. 31,959 respectively. The net benefit cost ratio is 1.06 and 1.29 at a price of Rs. 2200 and Rs. 2360 per quintal of local and improved varieties of turmeric rhizomes.

Patil *et al.* (2004) conducted study on economics of production of turmeric in Sangli district of Maharashtra, the results of the study showed that the per hectare cost A, cost B, and cost C were Rs. 1,63,824.31, Rs. 2,29,098.67 and Rs. 2,36,298.67 respectively. Per hectare gross income from turmeric is profitable enterprise in Sangli district.

Birari *et al.* (2006) conducted a study on farm level production, processing and marketing of turmeric in Western Maharahtra. The study revealed that per hectare returns from the cultivation of turmeric were Rs.27,272.25. On account of processing turmeric, the value addition resulted in additional benefits. The producers share in the price paid by the consumer was quite satisfactory and can be increased due to the non-perishable product of processed turmeric.

Rajesh (2006) worked out the economics of vanilla cultivation in Uttar Kannada district of Karnataka, the net present value of the cash inflow per ha was Rs. 18,56,659.40 on small farm and Rs. 24,48,524.8 on large farm. B:C ratio was 10.71 on small farm and 13.71 on large farm. The internal rate of returns was 58 percent on small farm and 65 percent on large farm. The break-even point for small farm was 145.22 and 127.98 kg for the large farm. In vanilla grown as pure crop, the net present value per ha was Rs. 49,42,593.61 on small farm and Rs. 53,73,993.35 on large farm.

Bala *et al.*(2007) analysed the economics of garlics cultivation in Kullu Valley of Himachal Pradesh and the results of the study indicated that the total cost of cultivation was Rs. 53,753 with an yield of Rs. 108.75 quintal per ha.,in that seed was the major constituent of the total variable cost accounting for 64 percent of it. The net returns over cost $A_{1,}$ A_2 were Rs.1,17,258 while those over cost B_1 and B_2 were Rs.1,16,848 and Rs.1,07,775 respectively.

Basavaraj (2007) analysed the cost of cultivation of chili in Karnataka, the total cost of cultivation per hectare was higher in Bijapur district (Rs.45, 109.80) followed by Gulbarga (Rs.44, 902.70) and Raichur (Rs.41, 686.60) districts. The overall cost of cultivation per hectare of chili was Rs.43, 899.71. The total return of obtained per hectare of chlli was more (Rs.78, 778.10) in Gulbarga district followed by Raichur (Rs.76, 642.10) and Bijapur (Rs.73, 945.87) district.

Varghese (2007) studied the economics of cardamom cultivation in Kerala, the Results showed that the cost acre was highest in case of large size groups (Rs. 38,668.44) followed by medium (Rs.37,371.28) and small size groups (Rs. 27, 685.67). But the yield per acre under small size groups was far below than the other two counterparts. Since every small and marginal farmer was having cows and buffaloes at home, they were applying more manure and cow dung.

Ajjan *et al.*(2009) estimated the economics of cultivation of tulsi in Tamil Nadu. It was evident from the results that the total cost of cultivation was Rs.32, 458 per acre, in that labour cost was accounted for about 34.28 per cent of the total cost. The yield of tulsi was Rs.11, 250 kg/ha. The gross returns obtained from the tulsi were about Rs.1, 50,000 per hectare and net returns observed was Rs.1, 17, 542.

Gupta and Sharma (2009) estimated the cost of cultivation of ginger in Himachal Pradesh, they found that the per hectare total cost of cultivation of ginger was Rs.1,62, 761, in that seed was the major cost component accounted for about 45 per cent of the total cost.

Average productivity of ginger was Rs.97.5 qt/ha and gross returns were Rs.1, 94, 805 per hectare. Net returns over the cost A, B and C in ginger were Rs.82, 687, 75,362 and Rs.32, 044 per hectare respectively. This showed that under normal conditions, ginger crop generated highly lucrative returns to the farmers.

Patil *et al.* (2009) conducted study on economic aspects of production, processing and Marketing of turmeric in Western Maharashtra, indicated that the mean cost of cultivation of turmeric was Rs.84, 420.56 per hectare. The 112.39 q of output *i.e.* the wet rhizomes gave the returns of Rs.1, 08,692.91 with the per quintal cost of production of 724.91 and the benefit cost ratio of 1.33. Per quintal cost of processing of wet rhizomes was Rs.156.25. The human labour was the major item and shared 44.10 per cent of the total cost of processing. This was followed by machine labour 27.73, utensil charges 21.34 and fuel 6.82 per cent. Even though processing loss of produce was about 67 per cent still the returns were raised to Rs.1, 49,760 as the processed produced fetched manifold higher price. The ratio of additional returns (Rs.41, 067.09) with additional cost (Rs.17, 549.98) was 2.34 indicated the value addition have resulted in more added benefits.

Puran *et al.*(2009) worked out the economics of cultivation of safedmusli in Haryana, the results of the study showed that the total cost of cultivation was Rs.1,82,152.30 in that planting materials accounted for about 55.55 per cent of total cost, the gross returns worked out was Rs.2,47,052.60. Returns over the variable costs worked out were
Rs.1,06, 259.10 and the benefit to cost ratio was 1.36.

Tripathi *et al.* (2009) investigated the impact of training on production and marketing of gingerin Ri-Bhoi district of Meghalaya. The study was based on the data collected from the 60 participants who attended the training programme on production and marketing of ginger at KVK, Umiam. The study revealed that there was substantial increase in the income of the farmers after attending the training. Before the training programme, the yield of ginger was recorded in the range of 8650 to 8925 kg/ha whereas after application of knowledge gained in the training progarmme the yield was recorded as high in the range of 18920 to 22500 kg/ha. The per kg production cost was reduced from 6.83 to 2.89. There was increase in net income in the range of 118-156 per cent as compared to net income of the farmers before the start of the programme.

Sirdhara (2010) studied the economics of chilli production under contract farming in Bagalkotdistrict of Karnataka, the results of the study revealed that per acre cost of chilli cultivation estimated to be 38721.36, 41238.37 and 39882.74 in Bilagi, Mudhol and overall study area respectively. The per acre yield of chilli obtained were 1122.98, 1088.67 and

1096.49 Kgs in Bilagi, Mudhol and overall study area respectively by the chilli farmers. The marginal productivity analysis indicated that there is a scope for reorganizing the resources like seeds, bullock labour and plant protection chemicals.

Mane *et al.* investigated the economics of turmeric production in Sangli district of Maharashtra; the results revealed that use of hired human labour was more than family human labour in turmeric production. The use of hired human labour, bullock labour and machine labour, increased with an increase in farm size. Whereas, the use of seed, FYM, nitrogen, phosphorus, potash, family human labour decreased with an increase in farm size. Per hectare net profit was 352053.97 in small farm followed by 344388.94 and 333662.36 on medium and large farm, respectively. The output-input ratio was 2.23 on small farm followed by that of 2.21 and 2.18 on medium and large farm, respectively. Per quintal cost of production in turmeric was 1475.75 on small farm followed by 1485.46 and 1501.09 on medium and large farm, respectively.

Shivaraja (2012) studied the cost of cultivation of chilli in Haveri district of Karnataka; the results revealed that area under chilli in Haveri district was showing a decreasing trend over the years. The total cost of cultivation of chilli per hectare was worked out to be 39343.92. The net return per hectare obtained by farmers was 19589.86.

Resource use productivity and efficiency:

Sekar and Ramaswamy (2001) studied the resource use efficiency in mung bean and found that the regression coefficients of human labour and seed were positive and significant which indicate that they are contributing significantly to increased farms returns. The results of MVP/MFC ratio showed that the ratio was positive and greater than unity for seed. That means there is scope to increase expenditure on this resource to increase production and returns in mung bean. For all other resources viz., human labour, bullock power, fertilizers and manures, MVP/MFC ratios were less than one or negative which implied that there had been excess use of resources and hence, there was a need to reduce their use.

Dileep *et al*. (2002) employed Cobb-Douglas production function to estimate the production function for tomato on sample farms and revealed that the R2 values indicated that the independent variables human labour (X_1), machine power (X_2), fertilizers (X_3) plant protection chemicals (X_4) and irrigation expenses (X_5) included in the production function to tomato explained about 54 to 96 per cent of variation in the production. Returns to scale did not depict a uniform pattern with the size of land holdings. It was more than unity in the case of overall (small and medium) category of non-contract farmers indicating increasing returns

to scale. On the other hand, it was less than unity in all other categories of both contract (medium and large) and non-contract farmers indicating diminishing returns to scale. The ratio of MVP to MFC in the case of human labour for medium holding size contract farmers was negative and significant indicating its excessive use. A similar trend was observed in irrigation also. However the ratio of plant protection expenditure in all the categories of contract farmers were negative and significant suggesting the need to curtail its excessive use.

Thilagavathi *et al.* (2002) analysed resource use efficiency of rainfed chilies in Southern Tamil Nadu and observed that the seven variables taken had explained 82 per cent variation in total output of rainfed chilies. The variable bullock labour (X_1) was found to be negative and significant in rainfed chilies. Machine power (X_2) was found to be non-significant. Human labour (X_3), manures and fertilizers(X_6) and plant protection chemicals (X_5) were highly significant. Seeds(X_4) were found to be negatively significant at 5 per cent level of probability. Area (X_7) was found to be significant at 10 per cent level of significance. MVP and OC ratio for variables X3 and X5 was greater than one (2.29 and 2.91 respectively), which showed that there is scope to increase the output through increased use of inputs X3 and X5.

Sunanda and Narender (2003) in their study on "Resource productivity of Mesta farms in Srikakulam district of Andhra Pradesh", reported that in small and medium farms human labour and cattle labour were positive and significant whereas the seed and manures and fertilizers were non-significant and negative. In large farms manures and fertilizers, human labours were highly significant at one per cent level. Production elasticity's of all farms recorded human labour, manures and fertilizers as significant at one per cent level. The MVP to OC values in small, medium, large and all farms revealed to be less than one. The R2indicated 86, 93, 88 and 95 per cent variation in gross returns of small, medium, large and all farms respectively in Mesta.

Krishna Reddy *et al*. (2004) studied "Resource productivity and resource use efficiency of paddy in Guntur district of Andhra Pradesh". The results indicated that in small farms human labour (X_3), plant protection chemicals (X_6) area under the crop (X_7) were significant at ten and five per cent level. The regression coefficient of land found to be non-significant and negative whereas tractor power (X_2), seed (X_4) and manures fertilizers (X_5) are non-significant and positive. In medium farms tractor power (X_2), seed (X_4), manures and fertilizers (X_5) and plant protection chemicals (X_6) were found to be significant and positive

whereas human labour (X_3), area under the crop (X_7) were non-significant and positive. Land found to be non-significant and negative. On large farms, land as rental value (X_1), tractor power (X_2), seed (X_4) were found to be significant, whereas human labour (X_3) and area under crop (X_7)were non-significant and negative and manures and fertilizers (X_5) and plant protection chemicals (X_6) were non-significant and positive. The R2value was 0.74, 0.81, 0.67 on small, medium and large farms respectively.

Processing cost involved in different stages:

Pant and Hada (2004) worked on marketing of maize (*Zea mays L.*) in Rajasthan. This investigation was carried out to study the marketing channels for maize and to estimate the marketing cost, margin of middle man and producers share in consumer's rupee in various in various marketing channels. He concluded that nine marketing channels existed and the percentage share of producer in consumer rupee was maximum in channel 1 (Farmer-Consumer) and channel 7 (Farmer-Floujl1Retailer Consumer) i.e. 99.95 and 89.68 per cent respectively. Village traders retained the highest margin which ranged from Rs. 35.60 to Rs. 147.00 per quintal followed by retailers whose margin ranged from Rs. 10.00 to Rs. 70.62 per quintal whereas commission agent cum wholesaler retained minimum margin of Rs.26.70 to Rs.63.75 per quintal.

Verma *et al.*(2004) studied the price spread, market efficiency and constraints in marketing of union in Indore district of Madhya Pradesh and revealed that producer received the maximum share of consumer's rupee in channel-I (97.33%) followed by channel-II (72.00%) and channel-Ill (58.12 %). The highest share in consumer's rupee was obtained by the farmers in channel-I as there was no intermediary between producers to consumer. In second channel, the producer received only 72.00 per cent of consumer's rupee and retailer received 11.27 per cent of consumer's rupee. In third channel, the farmer still received 58.12 per cent less than consumer's rupee. The share of wholesaler and retailer were 5.00 and 10.00 per cent of consumer's rupee respectively. The intervention of market intermediaries had reduced the producers share in consumer's rupee. Comparison of marketing efficiency by Shepard's method indicated that channel-I (36.05) was most efficient followed by channel-II (4.98) and channel-III (2.72).

Suryavanshi *et al.*(2006) conducted a study on economic analysis of tomato marketing in Latur Districts of Marathwada region. They identified marketing channels, to estimate marketing cost, marketing margin and price elasticity. The study revealed that 80per cent of

the tomato was sold through channel (producer commission agent cum wholesaler-retailer-consumer). The cost of marketing incurred was the highest (Rs. 187.45) in channel-i, where as it was the lowest (Rs. 55.40) in channel (producer -consumer). Marketing efficiency was observed to be the highest (9.70%) in channel (producer-consumer) for achieving maximum profit and to reduce intermediary charges in trade, when the produce is in small quantity and if the produce is in large quantity channel-Il should be selected to safeguard the interest of tomato growers.

Ateeq (2006) studied the value chain analysis for coffee in Kodagu. The processing cost was found to be higher in large size processing units (Rs.69045.09/tonne), compared to medium (Rs. 55402.86/tonne) and small (Rs.36690.34/tonne) size processing units. The net returns per tonne of output obtained were higher in large size processing units (Rs. 1811.79) compared to other categories of processing units. Further, business ratio analysis showed that large size processing units were more efficient compared to small and medium size processing units. The actual production of output in all the categories of processing units was more than the breakeven volume of output.

Suhasini *et al.* (2009) studied market survey and value chain analysis of chickpea in Andhra Pradesh. Processors supply dal, flour and fried gram to consumers, whole sale market, retailers and super markets. Net margin for dal was found to be Rs. 178 per quintal, net margin on sale of flour is Rs. 137.11 per quintal and gram Rs. 114.74 per quintal. The net margin to the retailers was Rs 294 and Rs.286 per quintal for whole grain sale of Kabuli and Desi type gram. Net margin is Rs.659 per quintal and Rs. 1018 per quintal per annum for split dal and flour to the retailers. The processors and traders have vertical integration assuming more than one function either forward or backward.

Papang and Tripathi (2014) studied that the Cultivation of turmeric in Meghalaya provides supplementary income to the farmers. The average yield of fresh turmeric in the study area was 49q/ha which on drying gives an approximate yield of about 14.7q/ha of semi-processed (dried) turmeric. The share of variable cost was about 98 % of the total cost. The total cost of cultivation (cost C_2) for turmeric was estimated at Rs.77, 012/ha whereas the net income was worked out to be Rs.6, 475/ha for fresh turmeric and Rs.28, 109/ha for dried turmeric. About Rs. 12, 71 9/ha of additional expenditure is incurred on post-harvest management of turmeric. The cost of production of turmeric is Rs. 15.68/kg, Rs.60.93/kg and Rs.70. 17/kg for fresh, semi-processed and processed (powdered) form, respectively. Lack of knowledge about pest management is the major constraint faced by farmers in production

whereas the fluctuation in disposal price of turmeric ranks first among the marketing constraints faced by farmers.

Marketing cost and marketing channel:

Pal (2002) worked on marketing of gram in Block Shahabganj, district Chandauli, Uttar Pradesh (an economic analysis). This study was conducted to analyze the marketable and marketed surplus of gram under different size groups and its distribution through different marketing channels in terms of marketing cost, margin and price spread. The total marketing cost was the highest in Channel II (Rs.149) due to involvement of large number of intermediaries and processing cost. Margins were also high in channel II (Rs.185). The producer's share in consumer's price was 96.72 percent and 77.61 percent in channel I and II respectively. In channel I the producer sold his produce directly to the consumer. Larger quantity of marketed surplus is marketed through channel II (62.57 percent).

Chahal *et al.*in their study marketing efficiency and price behavior green peas in Punjab reported that the producers of green peas in Hoshiyarpur and Ludhiana disposes of their produce through four agencies. They also reported that the producer's share in consumer rupee was 64.57 percent in channel III which was higher than channel I (57.98%) because of lower number of intermediaries involved in channel III. They inferred that the price spread were higher in channel I (44.68%) and channel 11(43.02%) as compared to channel Ill (35.43%) because the produce was sold directly to consumers in channel III. The index of marketing efficiency was found to be higher in channel 111(1.82) as compared to channel 1(1.24) and channel 11(1.38) as net price received by producer was higher in channel III due to the elimination of middlemen in this channel.

Chand *et al.*(2010) studied price spread, marketing efficiency and constraints of carrot marketing in Rajasthan. They calculated the marketing efficiency by using Shepherd and Acharya's modified method. They reported that the price received for per quintal of carrot and farmer's share in consumer rupee was more in channel II (33.04%) in comparison to channel I (25.08%). The Acharya's modified measure of marketing efficiency of carrot sold by farmer was 0.33 and 0.49 in channel I and II respectively.

Sidaram *et al.*(2010) studied adoption of organic farming practices and marketing behavior of pigeon pea growers in Gulbarga district of Karnataka. A greater majority of growers (90.00%) have sold the produce in regulated market. Majority marketed through commission agents (77.50%). As the Commission agent share having good exposure to the

markets and having contact with large number of buyers, hence they sold the produce through commission agents for a good price and more demand in the market. Nearly 81.67 per cent of farmers got the market price information through personal visit to market or by over a phone followed by other farmers who had visited the market (68.33%).

Sidhu *et al.* (2010) have analyzed the supply chain of onion and cauliflower in the Patiala district of Punjab. They have shown that cultivation of onion was more profitable (74,597/ha) than of cauliflower (38,072/ ha). These vegetables were being disposed-off mainly through commission agents/wholesalers (more than 90%), followed by retailers and consumers. Study has suggested that efficiency of the prevailing marketing channels could be improved by integrating with the organized retail chains and modernizing vegetable marketing system.

Sidhu *et al.* (2011) studied the marketing efficiency of green peas under different supply chains in Punjab. The marketing of green peas has been studied by three supply chains, viz.

I: Producer---Wholesaler (Through commission agent)---retailer---consumer

II: Producer---retailer (Through commission agent) ---Consumer

III: Producer---Consumer.

The net price received by the producer was 67 per cent, 69 per cent and 94 percent in supply chains I, II and III respectively in the Hoshiarpur market in January, 2009. The producer's share in supply chain III was the maximum because of direct sale by the producer to the Consumer. The supply chain Ill has been found most efficient because its marketing efficiency was 14.83 as compared to 2.70 in supply chain II and2.38 in supply chain I. The low marketing efficiency in supply chain I was on account of a higher number of market intermediaries in this chain. The marketing efficiency declined by 0.45 per cent and 0.44 per cent, respectively.

Trienekens (2011) studied a balanced analysis of value chains and proposed three key elements: network structure, of horizontal and (vertical) market channel relationships; value added, as related to the key competitive aim of any business chain; and governance, covering organizational arrangements between value chain actors. Value chain actors may be motivated to improve their position in the chain by changing their production of value added, their relationships (governance) with other actors in the value chain and by choosing different

market channels for their products. Finally, the role of non-value chain actors, such as development organizations and interest groups, in upgrading value chains has not been widely examined.

3. MATERIALS AND METHODS

Every research carried out on scientific line should have a research design to be applied as per the stated problems. For this, in present study a design has been drawn for classification of research method adopted. This chapter involves various steps applied to the study of the problem.

The material and methods are described in the following sub heads:

3.1 Description of the study area.

3.2 Sampling technique.

3.2 Method of investigation

3.4 Analytical procedure to be used.

3.1 Description of the study area:

Koraput District located in the backdrop of green valley's contemplating immaculate freshness, was established on 1st April, 1936. Decorated by forests, waterfalls, terraced valleys and darting springs, the District draws the nature loving people. The Koraput District lies at 17.4 degree to 20.7 degree North latitude and 81.24 degree to 84.2 degree east longitude. The District is bounded by Rayagada in the east, Bastar District of Chhatisgarh in the west and Malkangiri District in the south. As far as the history of the District is concerned, the region of Koraput existed far back in the 3rd century BC when it belonged to the valiant and dreaded Atavika people. The region was ruled by several dynasties, like Satavahans, Ikshvakus, Nalas, Ganga kings and kings of Suryavanshi, who nominated the Koraput region before the arrival of British. Finally the Koraput became a District in the year 1936.

The Koraput District covers an area of 8807 sq km consisting total 13, 79,647 population as per 2011 census. The District has got 2 sub divisons namely Koraput and Jeypore. There are total 14 Tahsils, 14 Blocks, three Municipalities, one NAC, 23 Police stations, 2028 Villages and 240 Gram Panchayats functioning in the District of Koraput.

3.2 Demographic features of Koraput District:

Koraput district encompasses a population of 1379647(as per census 2011) from which number of male 678809 and female 700838 which shown in table 3.1. Out of total

population, 16.39 percent people lives in urban areas while 83.61 percent lives in the rural areas. The average literacy rate in urban areas is 81.8 percent while that in the rural areas is 42.37 percent. Also the sex ratio of urban areas in Koraput district is 966 while that of rural areas is 1046. The total literacy rate of Koraput district is 49.21 percent from which male literacy is 60.32 percent and the female literacy rate is 38.55 percent in Koraput district. Scheduled Caste (SC) constitutes 1, 96,540 (14.2 percent) while Scheduled Tribe (ST) were 6, 97,583 (50.6 percent) of total population in Koraput district of Odisha. Hindu people are 93.8 percent, Muslim 0.64 percent, Christian 4.97 percent, Sikh 0.04 percent, Jain 0.04 percent, Buddhist 0.02 percent and other are 0.25 percent.

The total area of Koraput district is 8,807 km^2.Thus the density of Koraput district is 157 people per square kilometre. As per the initial provisional data of census 2011, around 172 sq.km. Area is under urban region while 8,635 sq.km. Is under rural region.

Table: 3.1 Population of Koraput district

Particular	Population in number	Percentage
Male	6,78,809	49.20
Female	7,00,838	50.80
Total	13,79,647	100

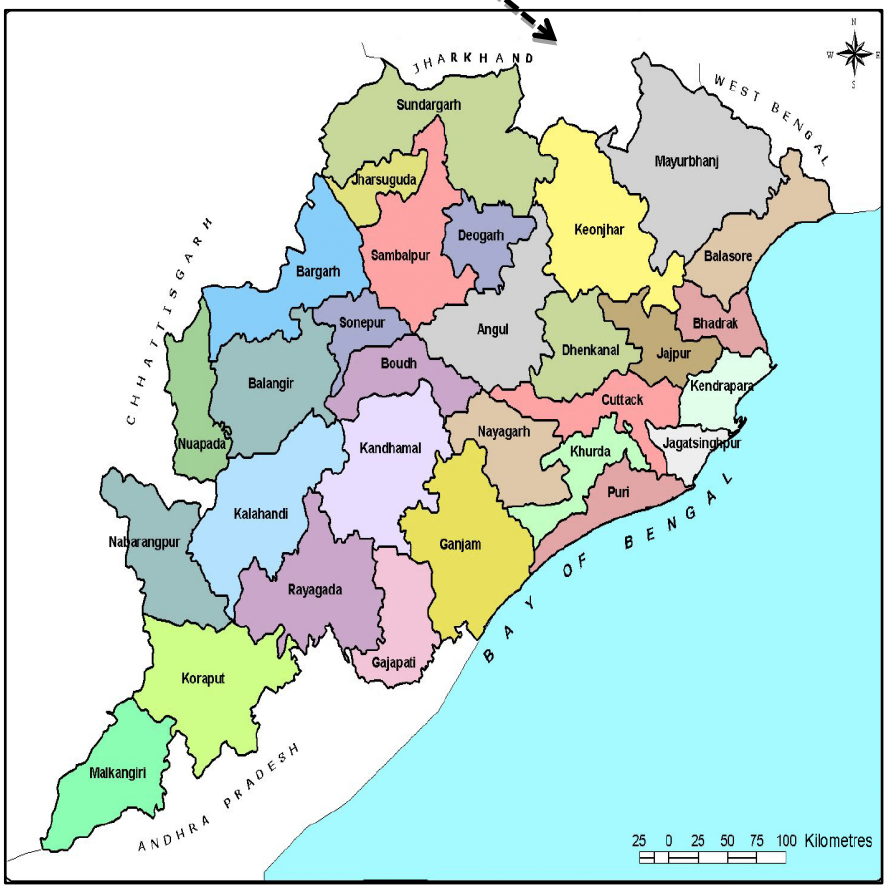
Source: Census 2011

3.1.2 Working Population

In Koraput district, out of population , are engaged in work activities percent of workers describe their work as main work (Employment or Earning more than 6 months) while percent were involved in subsidiary occupation providing livelihood for less than 6 months. Of workers engaged in main work, are cultivars (owner or co-owner) while are agricultural labourer. It was evident from table 3.2 that marginal farmers were, Small farmers were and big farmers were in numbers.

INDIA

ODISHA STATE



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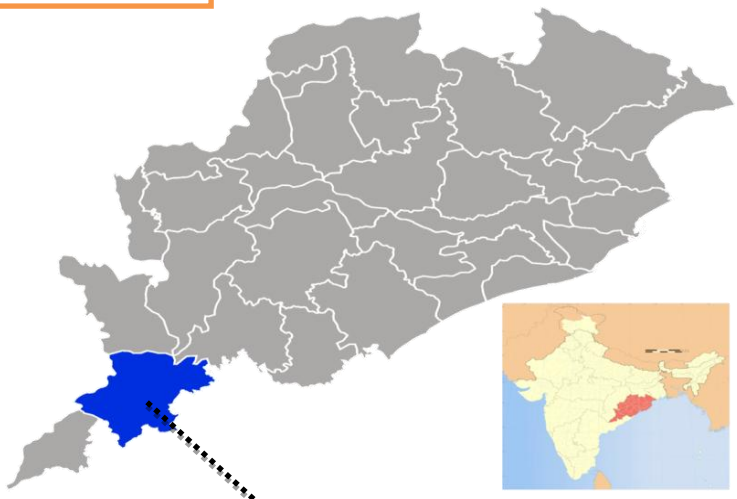
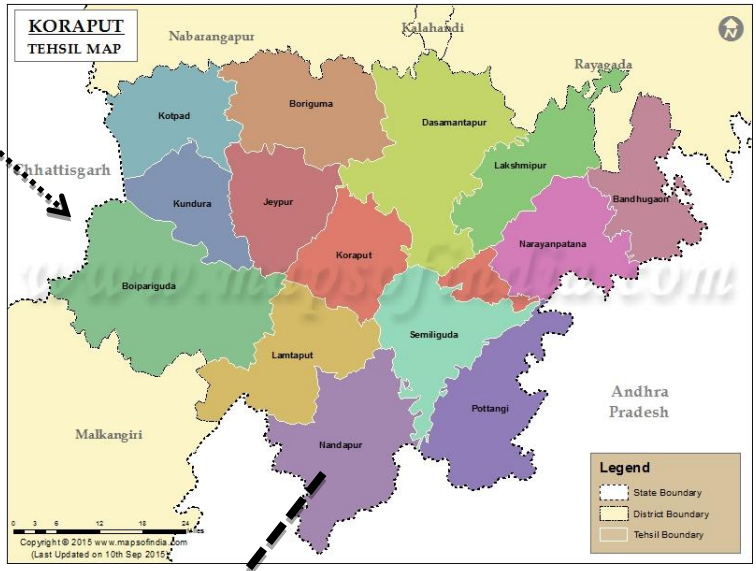


KORAPUT DISTRICT



NANDAPUR BLOCK

Particulars	Operational holding in Numbers	Percentage
Marginal	83688	56
Small	63730	42.5
Big	1160	1.5
Total	148578	100

Source: Agenda notes for District Agricultural Strategy Committee meeting of Koraput District 2016-17.

3.1.3 Location of the Study Block:

Nandapur block has been selected for the aforesaid study. It is located at 18.56^0 N 82.96^0 E. It has an average elevation of 880 meters (2887 feet). Nandapur block of Koraput district has total population of 72,579 as per the Census 2011. Out of which 35,322 males while 37,257 are females. In 2011 there were total 19,204 families residing in Nandapur Block. The Average Sex ratio of Nandapur Block is 1,055.

3.1.4 Demographic features of Nandapur Block:

As per Census 2011, out of total population, 12 percent people lives in urban areas while 88 percent lives in the rural areas. The average literacy rate in urban areas is 80.5 percent while that in the rural areas is 19.5 percent. Also the Sex Ratio of Urban areas in Nandapur Block is while that of rural areas is 1055.

The population of Children of age 0-6 years in Nandapur Block is which there are 272 male children and 215 female children between the ages 0-6 years. Thus as per the Census 2011 the Child Sex ratio of Nandapur block is which is less than Average sex ratio of Nandapur Block. The total literacy rate of Nandapur Block is 69.77 percent. The male literacy rate is 80.48 percent and the female literacy rate is 59.34 percent of Nandapur Block. Schedule Caste (SC) constitutes 16.38 percent while Schedule Tribe (ST) were 18.08 of total population in Nandapur Block. In Nandapur Block, out of total population were engaged in work activities. 70 Percent of workers describe their work as main work (Employment or Earning more than 6 months) while 30 percent were involved in marginal activity providing livelihood for less than 6 months.

3.1.5 Soil and Climate

Turmeric requires well drained, loose and friable loamy or alluvial soil. Nandapur block is suitable for turmeric production.

Climatic conditions of Nandapur Block is warm and humid. Average annual rainfall of the block is 1567 mm. Mean maximum summer temperature is 34.1 C and Mean minimum winter temperature is 10.4 C.

3.2 Sampling Technique:

The sampling is done by multistage sampling technique for the selection of ultimate farmers. In the first stage, from among major turmeric growing districts of the state, Koraput district was found to be a good yielder of turmeric.

3.3 Method of Investigation:

Information about the sample villages and respondents were collected through a set of pre-tested questionaries' with the specific objectives. General information regarding the sample villages were obtained from secondary sources such as block offices, Revenue Departments, AAO offices, AHO offices, VAWs and Census report. Area, Production, Productivity of Koraput district also collected from secondary sources. All other primary data was collected from respondents through personal interview by visiting houses and their fields.

For data collection households was taken as the unit of investigation and the head of the family as the respondent. As a common phenomenon prevailing in the most of the villages of the country, the farmer these villages also did not keep any records of their farming operation and farming expenditure. So it is little bit difficult to collect exact data which they invested in farming procedure.

Data were collected through personal interview with the respondent. The operational holding on the area which was actually cultivated by the farmer irrespective of its ownership, has been defined as the purpose of the study.

3.4 Analytical procedure to be used:

To examine cost and return on turmeric cost of cultivation data were taken.

3.4.1 Cost concept:

For assessing the cost and return of turmeric crops, seven cost concept were used viz. cost A_1, cost A_2, cost B_1, cost B_2, cost C_1, cost C_2 and cost C_3.

Cost A_1 = All actual expenses in cash and kind incurred on production activity by the farmer.

+Cost of hired human labour

+Value of own bullock labour

+Value of hired bullock labour

+Value of manure and fertilizer

+Value of pesticides

+Value of Seeds

+Value of Land revenue

+Value of depreciation and repairs

Cost A2 = Cost A1+ Rent paid for leased land

Cost B1 = Cost A1+ interest on value of own capital assets (excluding land)

Cost B2 = Cost B1 + imputed value of owned land (opportunity cost of owned land) less land revenue paid

Cost C1 = Cost B1 + imputed value of family labour

Cost C2 = Cost B2 + imputed value of family labour

Cost C3 =Cost C2 + 10 percent of Cost C2 (On account of managerial function performed by farmer)

- Fixed costs
  It includes the following items :

- Land revenue.
- Depreciation on implements and farm houses.
- Rent paid foe leased in land.
- Rental value own land.
- Interest on owned fixed capital (excluding land).
- Total cost
- Fixed cost and
- Operational cost both taken together

3.4.2 Estimation of Working Capital

I. Bullock labour: Both hired bullock labour are charged at Rs.220 per pair per 6 hrs a day of working hours, local hiring rate of a pair of bullock was Rs. 180 per 4 hrs. working per day. Imputed value of own bullock are also calculated accordingly.

II. Human labour: This constitute hired labour. The cost of all categories of human labour i.e. family labour, permanent labour and hired labour was calculated at the prevailing rate of Rs.200 per adult male worker for six hours working in a day. Female worker is paid Rs.150 for six hours working in a day. Both cash and kind payment made to hired labour were taken into account. Family labour are taken into account for calculation of Cost C.

III. Seeds: The seed cost includes the cost of purchased seeds. Farmers saved seeds are also take into account. Seeds were purchased from agriculture office and government sources.

IV. Manures and fertilizers: At purchased price the home produced manures were valued at local market price plus the cost of transportation of manures to the field.

V. Plant protection measures: The cost of plant protection pesticides were calculated at purchased price.

VI. Hired machinery charges: This includes both owned and hired machinery used for their farming operation. Hence the machinery were used in the form of sprayer for pesticide application.

VII. Interest on working capital: Interest on working capital was computed at the rate of 12 percent per annum for half the price of cropping season covering the time span intervening between sowing and marketing of crop.

VIII. Miscellaneous charges: This cost includes the cost of minor repairs and maintenances charges of farm implements, cost of ropes, watering jugs, bamboo basket and other unaccountable cost.

3.4.3 Trend Analysis:

A trend Analysis is an aspect of technical analysis that tries to predict the future movement of a stock based on past data. Trend analysis is based on the idea that what has happened in the past gives trader's idea of what will happen in the future. Trend analysis is the process of trying to look at current trends in order to predict future ones and is considered a form of comparative analysis.

3.4.4 Compound annual growth rate:

Compound annual growth rate (CAGR) is a business and investing specific term for the geometric progression ratio that provides a constant rate of return over the time period. CAGR is not an accounting term, but it is often used to describe some element of the business The compound Account Growth Rate (CAGR) is the mean annual growth rate of an investment over a specified period of time longer than one year.

Compound growth rate were analyzed using the method of least squares by fitting the semi logarithms functions.

$Yt = ABt + u$

In the logarithm form the function could be expressed as

$\text{Log } Yt = \text{Log } A + t (\text{Log } B) + \log u$

Where,

Y_t = dependent variable (area)

A = intercept term

B = (1+r) and r is the compound growth rate

T = time period

U = error term

Log ‘A’ and ‘B’ were obtained using the ordinary least squares procedures, and the R2 was computed for the goodness of ft. {Antilog of log (b) -1} *100 gave the percent growth rate).

Significance of the results was tested using‘t’ test.

3.4.5 Cob-Douglas production function:

The Cob-Douglas production function is a particular functional form of the production function, widely used to represent the technological relationship between the amounts of two or more inputs. In the present study yield was taken as dependent variable whereas seed cost, fertilizer cost, manure cost, human labour cost and bullock labour cost were taken as independent variables.

The production function is as follows,

Qt = b0 b1sb2Fb3Mb4Hb5B

Where, Qt = Yield per acre in Rs.

S = Cost of Seeds

F = Cost of Fertilizer (in Rs.)

M = Cost of Manure (in Rs.)

H = Cost of human Labour (in Rs.)

B = Cost of bullock labour (in Rs.)

B0, b1, b2, b3, b4, b5 are parameters of production function

Log linear form of Cobb- Douglas production is as

Ln (Qt) = ln (b0) +S(lnb1) + F(lnb2) + M(lnb3) + H(lnb4) + B(lnb5)

3.4.6 Garret ranking:

Garret ranking find out the most significant factor which influences the respondent, Garrett’s ranking technique was used. As per this method, respondents have been asked to

assign the rank for all factors and the outcome of such ranking have been converted into score value with the help of the following formula:

Perception position = 100 (Rij—0.5)/Nj

Where Rij = rank given for the ith variable y jth respondents

Nj = Number of variable ranked by jth respondents

With the help of Garrett's Table, the percent position estimated is converted into scores. Then for each factor, the scores of each individual are added and then total values of score is calculated. The factors having highest mean value is considered to be the most important factor.

RESULTS

In this chapter assembled data after processing and analysis are presented in an appropriate and logically consistent tabular form. This chapter is necessary because the collected data are discussed in a logical order that is consistent with the major objectives or focus of the research problem. This chapter also deals with interpretation of the true meaning of the facts presented, in terms of the purpose of the study in the form of data. The purpose of interpretation and generalization is to search for the broader meaning of these answers by linking them to the other available knowledge. For the convenience of the study the chapter has been divided into five sections as below.

4.1 Socio-economic characteristics of turmeric growers

4.2 Costs and return of turmeric crop.

4.3 Resource use productivity and efficiency of turmeric in the study area.

4.4 Processing cost involved in different stages of turmeric.

4.5 Marketing cost and price spread in different marketing channel

4.6 Major constraints faced by farmers in production of turmeric.

4.1 Socio-economic characteristics of turmeric growers:

Since operational, organizational and managerial efficiency of the farm business is reflected by the personal, family characteristics, socio economic structure and farm resource availability of turmeric growers, so it is necessary to describe the status of turmeric growers which is as below.

The important decision of the farm business like allocation of resources, use of inputs, cropping pattern, farm managerial decisions and marketing are generally made by the farmer as the supreme of family. Therefore, it is pertinent to have an idea regarding the age and education level of turmeric growers which are found to be more important characteristics in farm efficiency and decision making ability.

Table 4.1 Socio Economic Characteristics of Sample Respondents (n= 60)

Sl. No.	Particulars	Unit	Number of Farmers	Percentage of total
I	Age group of the farmers	Number		
	Below 40 years		15	25
	41-60 years		33	55
	Above 60 years		12	20
II	Education	Number		
	Illiterate		32	53.33
	Primary		12	20
	Secondary		16	26.66
III	Family Type	Number		
	Nucleus		35	58.33
	Joint		25	41.66
IV	Family Composition	Number		
	Male (Adult)		14	23.33
	Female (Adult)		38	63.33
	Children		8	13.33
	Average family size			
V	Livestock status	Number		
	Goat		57	25.67
	Hen		60	27.02
	Cow		34	15.31
	Buffalo		29	13.06
	Sheep		42	18.91
VI	Agricultural as occupation	Number		
	Main		38	63.33
	Subsidiary		22	36.66
VII	Average Annual Income	Rupee		
	Main		62598	
	Subsidiary		38695	
VIII	Average area under turmeric	Hectare	1.57	

The socioeconomic profile of turmeric growers of the study area is presented in Table 4.1. The average age of the sample farmers was found to be 52 years. Among the traditional farmers 53.33 percent were illiterate, 20 percent received primary education, 26.66 percent received secondary education and none of them went for post-matriculation studies. Among the farmers58.33 percent were having nucleus family. The average family size of the respondent was found to be six. The analysis of the occupational pattern of the sample respondents revealed that, in the study district, all the sample farmers practiced agriculture as main occupation. The average annual main income and subsidiary income of traditional farmer was Rs. 62598 and Rs. 38695 respectively. The average area under turmeric crop for

traditional farmers was 1.57 ha. Livestock is an important source of income for farm families. Adding livestock to cropping system significant reduces the risks associated with farm income.

4.2 Cost involved in Turmeric cultivation:

In the farm management studies costs are viewed from different angles for different purposes. Costs of cultivation are used by the Agricultural Cost and Price commission for fixation of support price of agricultural commodities. Besides this, they are also useful in farm planning and policy making. Therefore, due consideration should be given to cover both fixed and operational costs to operate agriculture as a business and not as a way of life only.

.It is observed from the Table that the total cost incurred in cultivation of turmeric at the overall farm was Rs. 168021 per hectare which was higher in small farm (Rs. 177740/ha) and lowest in large farm (Rs. 159394/ha). This revealed inverse relation with the farm size due to scale economies. The operational cost was 80.50 per cent (Rs. 135252) of the total cost and the fixed cost was Rs. 17494.55, accounted for around 19.50 percent of the total cost.

The labour cost on an average accounted to be 28.38 per cent of the total cost which varied from 22.67 per cent in small farm to 28.65 per cent in large farm. The variation in total labour requirement among different size farms is due to difference in the style of operational practices.

Among material cost, seed alone contributed about 18.73% of the total cost lowest (Rs. 30315/ha) being in large farm and highest being in small farm (Rs. 33178/ha). Manure and fertilizer together was responsible to cost 13.32 per cent of the total cost on sample farm which varied between 12.84 to 13.82percent for different size groups. Irrigation cost on an average accounted to be 11.01%of the total cost. Plant protection chemical cost was around 2.15 per cent of the total cost. Interest on working capital was to the extent of 6.89 per cent of total cost on various sizes of farms. Rental value of land fixed items shared 8.09 % of the total cost which revealed inverse relation with farm size. The yield of main product per hectare was found to be 47.5 qt/ha lowest being in large farm (47.54) and highest being in small farm 57qt/ha, indicating the intensive cultivation of turmeric by sample farmers in the study area.

Table 4.2 Cost of cultivation of turmeric on Sample farm (Rs/ha)

Particulars		Size group			
		Small	Medium	Large	Overall
1. Operational cost					
A. Human labour	Family	28828	22853	10914	20865
	Hired	12608	17399	25362	18456
B. Bullock labour	Owned	5000	4800	4000	4600
C. Machine labour	Owned	-	-	5400	1800
	Hired	3400	2500	1967	1967
Sub Total		49836	47552	45676	47688
2. Material cost					
A. Planting material		33178	36315	33178	31471
B. Manure		24574	26158	24574	22387
C. Fertilizer					
D. Irrigation		20500	22500	20500	18500
E. PPM		3856	4100	3856	3619
Total material cost		82108	75351	70473	75997
Interest on working capital@ 12.5%		12363	11516	10883	11587
Total operational cost		144307	134419	127032	135252
3. Fixed Cost					
A. Rental Value of land		13600	13600	13600	13600
B. Depreciation		2440	2445	2500	2649
C. Revenue/tax		25	25	25	25
D. Interest on fixed cost@10%		1205.25	1209.37	1246.87	1220.55
Total fixed cost		17275.25	17334	17871	17494
A. Total cost (Operational + Fixed cost)		161582	151753	144904	152746
B. 10% managerial cost		16158	15175	14490	15274
C. Total cost		177740	166928	159394	168021
Main production (q/ha)		57	51	47.5	52.16
By Product (q/ha)		7.5	6	5.6	6.36

Almost every day in farm organization and operation cost consideration enters. It is an important tool for measuring farm business activities. The farm management specialists have specified cost of cultivation into cost A_1, A_2, B_1, B_2 Cost C_1, C_2 & C_3. These cost concepts have already been taken up in the methodology chapter. In this section efforts have been made to discuss cost of cultivation according to various costs concepts.

The table 4.2 clearly shows that on an average total cost of (cost C_3) Rs. 168021 per hectare was required to produce this crop of which 57.95% comprised for the variable cost commonly known as cost $A_1$and A_2 After adding interest on fixed capital to cost A1, the cost

went upto 60.38% as cost B_1 and when imputed value of land was further added it was increased upto 82.69 per cent. Thus cost the C_2 and 10 per cent cost of the cost C_2 when added in this cost, it form total cost or cost C_3. Table further inferred that cost A_1 to Cost C_3 decreases with the increase in size of holding.

Table. 4.3 Cost of cultivation of Turmeric according to cost concept on sample farms

Sl no.	Cost	Size group			
		Small	Medium	Large	Overall
1	Cost A_1 &A_2	117949	114091	11143	117061
2	Cost B_1	119154	115300	120390	118281
3	Cost B_2	132754	128900	133990	131881
4	Cost C_1	147982	138153	131304	139146
5	Cost C_2	161582	151753	144904	152746
6	Cost C_3	177740	166928	159394	168021

In any field of business activity profit is the prime consideration. Thus, how much a farmer earns as net income and family labour income as a producing unit and how much satisfaction he and his family derives as a consuming unit are the major deciding factor in organization and operation of farm. Hence, in this section efforts have been made to estimate the gross income, net income over operational and total cost, family labour income, Benefit cost ratio, cost of production of turmeric a sample farm.

From the table 4.3 it is clear that the total cost from turmeric are Rs. 177740 Rs.166928 and Rs.159394 in case of small, medium and large farm with an average of Rs.168021 on sample farm. Thus, total cost incurred in turmeric production decrease with an increase in farm size. When physical output and by-product obtained from turmeric are converted into monetary terms Benefit cost ratio in other words can be termed as the return per rupee of investment. The Benefit cost ratio was more favorable to small farm (1.77), followed by medium farm (1.64) and large farm (1.60). Therefore, it could be concluded that there is decrease in the ratio of benefit cost ratio as the size of land holding increase.

A glance of the date given in the table 4.4 shows that per hectare net income over operational cost ranged between Rs. 128967.84 to Rs. 166792.85 per hectare.

Table. 4.4 Profitability of turmeric production on sample farm

Sl No	Economic Parameter	Size group			
		Small	Medium	Large	Overall
1	Total operational cost	144307	134419	127032	135252
	Total cost	177740	166928	159394	168021

2	Main produce	27360	244500	228000	250368
3	By produce	37500	30000	28000	31800
4	Gross income	311100	274800	256000	282168
5	Net income over				
(i)	Operational cost	166792	140380	128967	146915
(ii)	Total cost	133359	1078711	96605	114146
6	BC ratio	1.77	1.64	1.60	1.67
7	Family labour income	178345	145899	122009	150286
8	Farm business income	193150	160708	136856	165106
9	Cost of production(Rs/q)	2755	2980	3001	2871

The variation noted reduced in terms of family labour income due to inclusion of a relatively higher imputed value of family labour. The net-income and family labour income decreased with the increase in farm size groups. The average per hectare family labour income was Rs. 150286 and was Rs. 178345 in the case of small farm, Rs. 145899 and Rs. 122009 in the case of medium and large size groups respectively. Which implied that net income decreased with increase in the farm size the cost of production per quintal varied from Rs. 2755 to Rs. 3000 with an average of Rs. 2871. Thus the farmers had been margins of profit the variation in cost of production among various size farms was due to level of investment and the level of physical output.

The level of turmeric production was found significantly higher on small farm (57qt/ha) over the medium (51qt/ha) and large (47.5qt/ha) farm. The average per hectare gross income was Rs. 282168 and it was Rs. 311100, Rs. 274800 and Rs. 256000 in the case of small, medium and large size group, respectively.

Break even analysis is carried out to arrive at that minimum level at which optimum conditions of cost and returns is equated that is no profit no loss point obtained where that return is equal to total cost . The break even yield as show in tale 5.11 implies that with the given cost and physical output, turmeric would remain proposition of no profit and no loss within the yield range of 29.21 to 57 qt/ha an small farm, 28.52 to51qt/ha medium farm and 27.37 to 47.5qt/ha on large farm, thus the existing cost of production and physical output of crop yielded sufficiency profit to the sample farms.

The break-even price per quintal was estimated to be Rs. 2611.61 on an average which varied between Rs. 2460.32 /qt on small farm to Rs 2611.61 on large farm and the

selling price as per the total market was Rs 4800/qt of turmeric. Thus, the farmer had sufficient incremental profit of Rs 2188 /qt in the study area.

The yield gap in turmeric crop was worked out by using the formula discussed in the methodology chapter and the results are presented in the table 4.6

The yield gap-I has been estimated by the difference in yield between potential yield and potential farm yield which denotes that there was a yield gap of 14 qt/ha being about (18.66) percent. It varied between 10 qt/ha in small farm followed by 15 qt/ha in medium farm and 17 qt/ha in large farm indicating that yield I increased as the farm size increase.

Table. 4.5 yield gap analysis of turmeric on sample farm

Size group	Potential yield (A)	Potential farm yield (B)	Actual yield on the sample farm (C)	Gap-I (A-B)	Gap-II (B-C)	Total gap (A-C)
Small	75	65	57	10	8	18
Medium	75	60	51	15	9	24
Large	75	58	47.5	17	10.5	27.5
Overall	75	61	52.16	14	9.16	23.16

The yield gap-II was 9.16qt/ha (12.81%) calculated on the basis of difference between potential farm yield and sample farm average yield. On different size of farm, yield gap-II ranged between 8qt/ha in small farm to 10-50 qt/ha in large farm. It shows a wide gap in yield on farmers field which should be minimized by adopting improved high yielding varieties coupled with optimum use of fertilizers, judicious use of irrigation water and other package of practices.

4.3 Resource use efficiency of Turmeric

The main purpose of any firm is to coordinate and utilize the farm resources on the production process so as to obtain the highest returns. in this context , the study of resource productivity assumes paramount importance. Resource use efficiency means how efficiency the farmer can use his resource in production process. It is very importance because our resource is very limited. The production function analysis offers a powerful tools in resource allocation under different economic social and cultural conditions in the farm and helping reallocation of farm resource.

Table 4.6 Regression coefficient of resources used in turmeric production on sample farm

Particulars	Size group			
	Small	Medium	Large	Overall
No. of farmers	20	20	20	60
Consent (a)	9.60	8.97	11.02	10.86
Regression coefficient (b) of				
Area under turmeric (X_1)	0.819	0.691	0.883	0.734
	0.22	0.697	0.008	0.005
Seed (X_2)	0.765	0.640	0.245	0.1560
	0.070	0.161	0.123	0.006
Fertilizer (X_3)	0.056	0.0081	0.072	0.092
	0.019	0.115	0.057	0.040
Farm power (X_4)	-0.021	-0.032	-0.031	-0.032
	0.126	-0.865	0.084	0.061
Irrigation (X_5)	-0.0082	0.005	0.0052	0.0132
	0.019	0.023	0.009	0.063
Σbi	1.65	1.31	1.17	1.06
R^2	0.88	0.86	0.79	0.83

(Figures in brackets indicate standard error of regression coefficient)
* Significant at 10% level of significance
** Significant at 5% level of significance
*** Significant at 1% level of significance

For calculating resource use efficiency five factors namely area under turmeric(X_1), farm power(X_2),seed(X_3),fertilizers(X_4), and irrigation (X_5) were considered and input of these factors on gross income. The details of production function estimates, standard errors of coefficients their significance and coefficient of multiple determination (R^2) are given in the table 4.6.

From the table 4.6 it is clear that the coefficients of multiple determination were about 0.83 on overall farm which varied between 0.79 on large farm to 0.88 in case of small farm followed by 0.86 in medium farm. So the variables included in the model were able to Explain the variation in gross income obtained from turmeric to the extent of 79 to 88 percent respectively.

The sum of the elasticity's of production ranged between 1.17 to 1.65 on different farms which was above unity and farmers are producing in the first stage of production. Thus confirming increasing return to scale. Result suggesting the need for expansion of turmeric Production in the study area.

In case of small farms the output elasticity coefficients for expenditure on seed (X_3) and area under turmeric (X_1) were statistically significant. The area under turmeric

cultivation had on elasticity of 0.819 indicating the one percent increasing in the land area would bring 0.819 percent increase in the gross. The seed and fertilizers applied in the cultivation had positive elasticity coefficients of 0.765 and 0.056 indicating that at current level these resources were under applied. There were some farmers who suffered water stress during the critical stage of plant growth the water stress days had a depressing influence on the production as indicating by the negative coefficient (-0.008) though it was statistically non-significant. Some farmers were able to give supplementary irrigation to mitigate the bad effect. The elasticity of coefficient for the farm power (X_2) used for the cultivation of turmeric was -0.021 but it was statistically non-significant indicating that a marginal increase in the amount of this input would not raise the total value of output realized.

In case of medium farm a unit increase in turmeric area (X_1), seed (X_3), fertilizes (X_4), and irrigation (X_5) will result in extra 0.691, 0.64, 0.008 and 0.005 unit of the output the .Respectively decrease output by 0.032 units. And indicated that increasing in farm power will not significantly affect the turmeric production. However a unit increase in farm power (X_2) will the value of the elasticity's of these variables reveal further scope for utilization of these inputs. In large farm the regression coefficient of turmeric area (X_1) and seed (X_3) were positive and significant at 1% and 5% level respectively which indicated that holding other factors constant one percent increase in turmeric area and seed would increase the gross return by 0.883 and 0.245 respectively. While in the case of fertilizer (X_4) and irrigation (X_5) 0.072 And 0.005 respectively which is positive but statistically non – significant indicated that increase in these inputs will effect on gross return, If expenses made on these resources then it will be gives profitable returns.

At the overall level the result indicates that the turmeric production has increasing returns to scale. In addition, land, seed, and fertilizers inputs are underutilized meaning that opportunities still exists to increase output by increasing the level of these inputs.

4.4 Marketing Channels and Price Spread in Turmeric:

The marketing channel is the chain of intermediaries through whom the produce moves from producers to consumers. Price spread refers to the difference between consumer price and net price received by the producer. The difference consists of the charges borne by the producer and other market functionaries and marketing margins of intermediaries involved in the system. In the study area, three important channels were identified in marketing of turmeric in the form of powder and in dried form in different markets and price spread has been calculated for these channels.

Channel- I Producer- Commission agent cum wholesaler-Distant wholesaler-Exporter

Channel-II Producer-Commission agent cum wholesaler- Processor- Wholesaler-Retailer-Consumer

Channel-III Producer-Processor –Exporter

Price Spread in Marketing Channel I

Channel I consist of Producer, Commission agent cum wholesaler, Distant wholesaler and Exporter .Price spread for turmeric in channel I is given in table 4.7. The analysis indicates that the net share of the producer in the consumer's rupee was 48.16 per cent. The cost incurred by producer on bagging, loading and unloading, transportation, spoilage loss, commission paid to commission agent and other expenses etc. was Rs. 89 per quintal which is 0.86 per cent of consumer's rupee. Among all the costs, commission paid to commission agent was high which was 0.24 per cent of total cost paid by the consumer. Net price received by the farmer was Rs. 4911.

Table 4.7 Price Spread in turmeric marketing through channel –I

Producer- Commission agent cum wholesaler- Distant wholesaler- Export			
Sl no	Particulars	Rs/quintal	Percentage of consumer price
1	Price received by the farmer as a producer	5000	48.16
2	Marketing cost incurred by producer		
	Bagging	10	
	Loadinh and unloading	20	
	Transportation	20	
	Spoilage	4	
	Commission paid to commission agent	25	
	Incidental charge	10	
3	Total marketing cost of producer	89	0.86
4	Net price received by producer	4911	47.3
5	Selling price of farmer or purchase price of commission agent cum wholesaler	5000	48.16
6	Marketing cost incurred by commission agent cum wholesaler		
	Marketing fee@1 percent	50	
	Transportation charge	20	

	Loading and unloading	15	
	Grading	2	
	Spiolage	2	
	Sales tax	150	
7	Sub total	239	2.3
8	Commission agent cum wholesaler margin	2000	19.26
9	Total marketing cost of commission agent cum wholesaler (7+8)	2239	21.56
10	Marketing cost incurred by distant wholesaler (5+9)	7239	69.3
	Marketing cost incurred by distant wholesaler		
	Market fee	25	
	Transportation charges	5	
	Loading and unloading	10	
	Grading	1	
	Spoilage	1	
	Sales tax	100	
11	Sub total	142	1.36
12	Distant wholesaler margin	3000	28.9
13	Total marketing cost of distant wholesaler (11+12)	3142	30.26
14	Selling price of distant wholesaler or purchase price of exporter (10+13)	10381	100
15	Price spread (14-4)	5470	52.26
16	Producers share in consumer rupee		47.30

The commission agent sold directly to the distant wholesaler at Rs.7239 per quintal. The costs incurred by commission agent were the market fee @ 1per cent, transportation cost, loading and unloading, grading, spoilage and sales taxes etc. which was Rs.239 per quintal i.e.2.30 per cent of consumer's rupee. Thus, the margin retained by the commission agent amounted to Rs.2000 per quintal which is 19.26 per cent of the consumer's rupee. Among the other costs, sales tax was high which 1.44 per cent of the consumer's rupee was.

The distant wholesaler sold directly to the exporter at Rs.10381 per quintal. The cost incurred by distant wholesaler was transportation cost, market fee, grading, spoilage, sales tax, etc. which was Rs.142 per quintal i.e. 1.36 per cent of consumer's rupee. Thus, the margin retained by the distant wholesaler amounted to Rs.3000 per quintal which is 28.90 per cent of consumer's rupee. The price spread which shows the difference between price paid by the consumer and price received by the producer is Rs.5470 per quintal.

Price Spread in Marketing Channel – II

The marketing channel two consists of producer, commission agent cum wholesaler, processor, wholesaler, retailer and consumer. Price spread for turmeric in channel II is given in table 4.8. The analysis indicates that the net share of the producer in the consumer's rupee was 30.02 per cent. The cost incurred by producer on bagging, loading and unloading, transportation, spoilage loss, commission paid to commission agent cum wholesaler and other expenses etc. was Rs. 89 per quintal which is 0.53 per cent of consumer's rupee. Among all the costs incurred by the producer in marketing of turmeric, commission paid to commission agent cum wholesaler was high with a share of 0.15 per cent of total cost incurred by the producer. Net price received by the farmer was Rs. 4911.

The commission agent cum wholesaler sold directly to the processor at Rs.7234 per quintal. The cost incurred by commission agent cum wholesaler consisted of market fee @1 per cent, transportation charges, loading and unloading charges, grading, spoilage, sales tax which amounted to Rs 234 per quintal i.e. 1.40 per cent of consumer's rupee. The margin retained by commission agent amounted to be Rs.2000 per quintal which is 12.01 per cent of the consumer's rupee. Among all the costs incurred by the commission agent sales tax was high which amounted to 0.90 per cent of the consumer's rupee.

The processor sold directly to the wholesaler at Rs.13933 per quintal. The cost incurred by processor included cost of packaging material, power charges, transportation cost, sales tax, spoilage loss, etc. which was Rs.699 per quintal i.e. 4.19 per cent of consumer's rupee. Thus the margin retained by processor amounted to Rs.6000 per quintal which is 36.03 per cent of consumer's rupee.

The wholesaler sold turmeric powder to retailers at Rs.15615.33 per quintal. The cost incurred by wholesaler was market fee @ 1 per cent, transportation charges, loading and unloading charges, grading, packaging, storage, spoilage etc. which was Rs.182.33 per quintal i.e. 1.09 per cent of consumer's rupee. Thus the margin retained by wholesaler amounted to Rs.1500 per quintal which is 9.01 per cent of consumer's rupee. Among the other costs market fee was high which accounted to 0.71 per cent of the consumer's rupee.

The retailer sold directly to the consumer at Rs.16652.33 per quintal. The costs incurred by retailer were, transportation cost, loading and unloading cost, storage cost, spoilage cost etc. which amounted to Rs.37 per quintal i.e.0.22 per cent of consumer's rupee. Thus the margin retained by retailer amounted to Rs.1000 per quintal which is 6 per cent of

consumer's rupee. The price spread which shows the difference between price paid by the consumer and the price received by the producer is Rs.11741 per quintal.

Table 4.8 Price spread in turmeric marketing through channel-II

Producer-Commission agent cum wholesaler-Processor-Wholesaler-Retailer-Consumer			
Sl. No.	Particulars	Rs./quintal	Percentage of consumer price
1	Price received by farmer as a producer	5000	30.2
2	Marketing cost incurred by producer		
	Bagging	10	
	Loading and unloading	20	
	Transportation	20	
	Spoilage	4	
	Commission paid to commission agent	25	
	Incidental charges	10	
3	Total marketing cost of producer	89	0.53
4	Net price received by producer	4911	24.49
5	Selling price of farmer	5000	30.2
6	Marketing cost incurred by commission agent cum wholesaler		
	Marketing fee@1 percent	50	
	Transportation charge	20	
	Loading and unloading	10	
	Grading	2	
	Spoilage	2	
	Sales tax	150	
7	Sub total	234	1.4
8	Commission agent cum wholesaler margin	2000	12.01
9	Total marketing cost of commission agent cum wholesaler	2234	13.41
10	Selling price o commission agent cum wholesaler or purchase price of processor	7234	43.41
11	Marketing cost incurred by the processor		
	Cost of packaging material	100	
	Power charges	249	
	Transportation cost	100	
	Sales tax	150	
	Spoilage tax	100	
12	Sub total	699	4.19

13	Processor margin	6000	36.03
14	Total marketing cost of processor	6699	40.22
15	Selling price of processor or purchase price of wholesaler	13933	83.66
16	Marketing cost incurred by the wholesaler		
	Market fee@1 per cent	119.33	
	Transportation charges	30	
	Loading and unloading	10	
	Grading	5	
	Packaging	10	
	Storage	6	
	Spoilage	2	
17	sub total	182.33	1.01
18	Margin of wholesaler	1500	9.01
19	Total marketing cost of wholesaler (17 + 18)	1682.33	10.1
20	Sales price of wholesaler or purchase price of retailer (15+19)	15615.33	93.77
21	Marketing cost incurred by the retailer		
	Transportation	20	
	Loading and unloading	10	
	Storage	5	
	Spoilage	2	
22	sub total	37	0.22
23	Margin of retailer	1000	6
24	Total marketing cost of retailer (22+ 23)	1037	6.22
25	Sales price of retailer or purchase price of consumer (20 + 24)	16652.33	100
26	Price spread (25 - 4)	11741	70.5
27	Producers share in consumers rupee		29.49

Price Spread in Marketing Channel – III

Price spread for turmeric in channel-III is given in table 4.9. This table indicates that the net share of the producer in the consumer's rupee is 64.94 per cent.

Producer sells to the processor at Rs.5000.00 per quintal. The cost incurred by producer on bagging, loading and unloading, transportation cost, spoilage ,commission paid to commission agent and miscellaneous charges etc. was Rs.89 per quintal which is 1.16 per cent of consumer's rupee. Thus, net price received by the producer was Rs. 4911.

The processor sold directly to the exporter at Rs.7699 per quintal. The cost incurred by processor consisted of cost of packing material, power charges, transportation cost, sales tax spoilages etc. which was Rs.699 per quintal i.e. 9.08 per cent of consumer's rupee. Thus, the margin retained by the processor amounted to Rs.2000 per quintal which is 25.98 per cent of consumer's rupee. The price spread which shows the difference between price paid by the consumer and price received by the producer was Rs.2788 per quintal.

Thus the above analysis clearly shows that longer the channel and more the number of intermediaries in the system, larger is the price spread and the share of producer in consumer rupee declines. The above results are in accordance with the findings of Thakare et al. (2011) who also gave similar results in their study on economics of production and marketing of cowpea in Amravati district of Maharashtra.

Table 4.9 Price spread in turmeric powder marketing through channel-III

Producer-Processor-Exporter			
Sl. No.	Particulars	Rs./quintal	Percentage of consumer price
1	Price received by farmers as a producer	5000	64.94
2	Marketing cost incurred by producer		
	Bagging	10	
	Loading and unloading	20	
	Transportation	20	
	Spoilage	4	
	Commission paid to commission agent	25	
	Incidental charges	10	
3	Total marketing cost of producer	89	1.16
4	Net price received by producer	4911	63.78
5	Selling price of farmers or purchase price of processor	5000	64.94
6	Marketing cost incurred by commission agent cum processor		
	Cost of packaging material	100	
	Power charges	249	
	Transportation cost	100	
	Sales tax	150	
	Spoilage	100	
7	Sub total	699	9.08
8	Processor margin	2000	25.98

9	Total marketing cost of processor (7+8)	2699	35.06
10	Selling price of processor or purchase price of Exporter (5+9)	7699	100
11	Price spread(10-4)	2788	36.21
12	Producers share in consumers rupee		63.78

Marketing channel efficiency:

The efficiency of each channel is analyzed and presented in the table .Marketing efficiency moves around the fact that to what extent the marketing agencies have been able to move the goods at minimum cost extending the maximum service from producer to final consumer.

Table 4.10 Marketing efficiency of different marketing channels

Sl No.	Channel	Consumer's price	Total marketing cost* (I)	Marketing efficiency
1	Channel-I	10381	5470	0.89
2	Channel-II	16652	11741	0.41
3	Channel-III	7699	2788	1.76

* Total marketing cost includes marketing cost and profit margin of intermediaries

Marketing efficiency represents the effectiveness of a marketing system which it operates. The Marketing Efficiency for channels I, II and III were 0.89, 0.41 and 1.76 respectively. It is concluded that the channel III is more efficient than channel I, II. This is because of the fact that channel-III involves only one intermediary and hence, this channel was more efficient than channel I and II. The channel II is seen as the less efficient because of presence of more intermediaries and multiplicity of margins to the intermediary and losses due to spoilage.

4.5 Process involved in Turmeric production:

Processing at farm level;

Cleaning; harvested turmeric rhizomes (75-80%) are cleaned by fresh water under pressure for removal of soil and other foreign matter.

Boiling; Cleaned rhizomes are submerged in hot water. Cured rhizome are then poured to a bamboo basket to drain the water and dried in yards. This process gives attractive color and

characteristics aroma to turmeric. Boiling kills the growth of fresh rhizomes, eliminates the odor, reduces the time of drying, ensure even distribution of color and gives better quality product by gelatinization of starch in rhizomes.

Drying: Sun drying takes 6-8 days, till it becomes thoroughly hard and brittle. The moisture content of the dried turmeric is kept at 8%-10% for better storage.

Processing at intermediary level

Assembling: Assembling of turmeric finger is the first function done by the intermediaries.

Polishing: Polishing of rhizomes is done by rubbing with hand under several folds of gunny cloth or using a polishing drum.

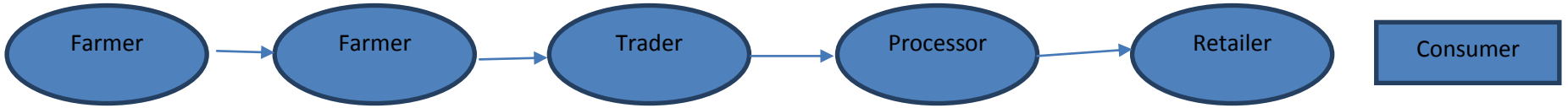
Grading: Grading was done by manually by the traders to fetch to fetch more price.

Milling: Usually, turmeric is milled on home scale I flour mills. Milling is done in two stages: namely breaking into small pieces and powdering them to the desired fineness.

Packaging: Well cured turmeric is kept in double burlap new gunny bags which are properly fumigated prior to packaging. Turmeric powder is packed in fiber board drums, multi wall bags and tin containers.

Fig 3.3 Cost and Margin at different Stages of Turmeric :

Item	Cost (Rs.)	Item	Cost (Rs.)	Item	Cost (Rs.)	Item	Cost (Rs.)	Item	Cost (Rs.)	
Total expenses for 1 quintal production	522	Boiling cost Drying cost	50 10	Purchase price Transportation Labour cost Storage cost Cleaning cost Polishing cost Grading cost Marketing cost Packaging cost	960 8 5 6 7 5 7 12 6	Purchase price Transportation Processing Labour cost Packaging cost Storage cost Marketing cost	1140 5 10 8 5 3 4	Purchase price Transportation Processing cost Labour cost Packaging cost Storage cost Marketing cost	1360 5 12 6 9 10 11	Consumer Price Rs.120/kg
Total	522	Total	36	Total	960 +56	Total	1140+	Total	1360+53	
Cost of Production (Fresh)	522	Cost of production	558	Cost of Good sold	1016	Cost of Good sold (Powder)	1175	Cost of Good sold (Powder)	1413	
Margin	278		402		124		185		987	
Farm Gate Price	800	Farm gate price	960	Sell price	1140	Wholesale price	1360	Retail price	2400	



4.6 Constraints faced in production and marketing of Turmeric in the study area:

Constraints faced by the farmers in the study area:

The major constraints faced by the farmers are identified by informal discussion in the study area, there are total 9 major problems are listed out along with some minor problems also which are presented in Table.4.11 The study revealed that the major problems faced in production are high cost of labour, lack of technical knowledge, low productivity and non-availability of quality seed. For marketing of the produce the sample respondents' ranked lack of storage facility as the greatest constraint.

Table. 4.11 Constraints faced by the farmers in the study area. (n=60)

Sl. No.	Constraints	Score	Rank
1	High cost of labour	76.40	I
2	Personal obligation with traders	71.24	II
3	Financial weakness	70.20	III
4	Lack of technical knowledge	56.90	IV
5	Lack of storage facilities	48.03	V
6	Low productivity	39.97	VI
7	Non-availability of quality seed	38.13	VII
8	Inadequate market information	37.70	VIII
9	Less government priority	33.70	IX

DISCUSSION

The results of the investigation presented in the previous chapter are discussed in this chapter under the following headings.

5.1 General features of the sample farmers.

5.2 Costs and return of turmeric crop.

5.3 Resource use productivity and efficiency of turmeric in the study area.

5.4 Processing cost involved in different stages of turmeric.

5.5 Marketing cost and price spread in different marketing channel

5.6 Major constraints faced by farmers in production of turmeric.

5.1 General Features of the sample farmers

Table 4.1 of preceding chapter revealed that, the average family size of the sample farmers was found to be .Among the respondents 25% come under below 40 years and 55% come under 41-60 yrs. This might be due to fact that, the youngsters were not involved in the agricultural professions as they were looking for jobs in more lucrative service sector. Among the traditional farmers, 53.33 percent illiterate. Due to illiteracy, the traditional farmers are unaware of the positive impacts of improved method of cultivation. In the study area it was studied that for most of the farmers, livestock is an important source of income with farm household showing higher preference towards rearing goat followed by hen and sheep. With this it could be concluded that. All the sample farmers depended on agriculture and allied activities for their livelihood and employment.

5.2 Costs and return of turmeric crop.

Total cost per hectare incurred in turmeric production on sample farm was Rs.168021 which decreased as the farm size increased. The proportion of operational cost and fixed cost to total cost on sample farm was 80.49 and 19.50 of the total cost was alone contributed by hired and family labours which varied between 28.38 per cent on different farm. Cost of cultivation according to various cost concepts (Cost A1 to Cost C3) in different size of farms decreased as the farm size increased.Net income obtained from turmeric production was Rs.114146per hectare with maximum of Rs.133359/ha on small farm to Rs.96606per ha on large farm revealing inverse relations with the farm size. Benefit cost ratio was 1.67 with

marginal variations in different size of holdings. Cost of production of turmeric varied from Rs.2756 to Rs.3000 with an average of Rs.2871 per quintal revealing on extra ordinary difference between the different size farms.

5.3 Resource use productivity and efficiency of turmeric in the study area.

The regression coefficient of farm power was positive and non-significant and seed was significant on large group and fertilizers were found significant in case of overall farm while coefficients of irrigation were found significant across all the size of groups.

5.4 Processing cost involved in different stages of turmeric.

The table presents approximate calculations of cost and margin at different stages of turmeric production. The turmeric goes through various stages from production to final consumption. The table represents only tentative calculations assuming the price of the dried turmeric to be at Rs, 48/kg and that of powder to be at Rs.120/kg to the consumers. However due to high fluctuations of price, especially

5.5 Marketing cost and price spread in different marketing channel

Marketing system of turmeric was observed to be totally market intermediaries dominant as majority of the producers were selling their produce directly to the market intermediaries in market and the margins charged by the intermediaries were major cost elements in total cost of marketing of turmeric. Three important channels of turmeric marketing were identified are

Channel - I Producer - Commission agent cum wholesaler - Distant wholesaler –Export.

Channel – II Producer - Commission agent cum wholesaler – Processor- Wholesaler –

Retailer – Consumer.

Channel - III Producer - Processor - Exporter.

Channel - I Producer - Commission agent cum wholesaler - Distant wholesaler - Exporter.

In channel I, the net share of the producer in the consumer's rupee was 47.30 per cent. The cost incurred by producer was Rs.89 per quintal which is 0.86 per cent of consumer's

rupee. The commission agent sold again to the distant wholesaler at Rs.7239 per quintal. The cost incurred by commission agent was Rs.239 per quintal which is 2.30 per cent of consumer's rupee. The margin retained by the commission agent amounted to Rs.2000 per quintal which is 19.26 per cent of consumer's rupee. The distant wholesaler sold directly to the exporter at Rs.10381.00 per quintal. The cost incurred by distant wholesaler was Rs.142.00 per quintal. The price spread which shows the difference between price paid by the consumer and price received by the producer is Rs.5470 per quintal.

Channel – II Producer - Commission agent cum wholesaler – Processor - Wholesaler – Retailer – Consumer.

In channel II, the net share of the producer in the consumer's rupee was 29.49 per cent. The cost incurred by producer was Rs.89 per quintal which is 0.53 per cent of consumer's rupee. The commission agent cum wholesaler sold to the processor at Rs 7234 per quintal. The cost incurred by the commission agent was Rs.234 per quintal which is 1.40 per cent of consumer's rupee. The margin retained by commission agent cum wholesaler amounted to Rs.2000 per quintal which is 12.01 per cent. The processors sold to wholesaler at Rs.13933 per quintal. The cost incurred by processor was Rs.699 per quintal which is 4.19 per cent of consumer's rupee. The margin retained by the processor amounted to Rs.6000 per quintal which is 40.22 per cent of consumer's rupee. The wholesaler sold to the retailer at Rs.15615.33 per quintal. The cost incurred by wholesaler was Rs.182.33 per quintal which is 1.09 per cent of consumer's rupee. The margin retained by the wholesaler amounted to Rs. 1500 per quintal which is 9.01 per cent of consumer's rupee. The retailer sold directly to the consumer at Rs.11652.33 per quintal. The cost incurred by retailer was Rs.37 per quintal which is 0.22 per cent of consumer's rupee. The margin retained by the retailer amounted to Rs. 1000 per quintal which is 6.00 per cent of consumer's rupee. The price spread which shows the difference between price paid by the consumer and price received by the producer is Rs.11741 per quintal.

Channel - III Producer - Processor - Exporter.

In channel-III, the net share of the producer in the consumer's rupee was 63.78 per cent. Producer sold to the processor at Rs.5000.00 per quintal. The cost incurred by producer was Rs.89.00 per quintal which is 1.16 per cent of consumer's rupee. Thus, net price received by the producer was Rs.4911. The processor sells directly to the exporter at Rs.7699 per quintal. The cost incurred by processor was Rs.699 per quintal i.e. 9.08 per cent of

consumer's rupee. Thus, the margin retained by the processor amounted to Rs.2000 per quintal which is 25.98 per cent of consumer's rupee. The price spread which shows the difference between price paid by the consumer and price received by the producer was Rs.2788 per quintal. Thus the above analysis clearly shows that longer the channel and more the number of intermediaries in the system, bigger the price spread and the share of producer in consumer rupee declines.

5.6 Major constraints faced by farmers in production of turmeric.

An informal discussion with the turmeric growers revealed that turmeric production and marketing involved various problems. The major problems along with Garrets score and ranks are presented in Table in the previous chapter. The study revealed that the major problems faced by the growers in production are high cost of labour non-availability of quality seed, lack of technical knowledge and low productivity.

The farmers also face problem at the time of marketing. The main problem was the resource poor producers are financially weak for which they borrow cash from local traders for their need which ultimately bound them to sell their produce to them with less bargaining power. This problem followed by others like lack of storage capacity, lack of market information.

The major problems faced by the trader include price fluctuations, mismatch between demand and supply, high marketing cost and storage problem.

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

Turmeric is a rhizomatous herbaceous plant botanically named as curcuma longa. Turmeric is a native of tropical South East Asia. India account for 82 per cent of the world's turmeric production and it is a major exporter of turmeric. India ranks first in production of turmeric in the world.

In view of economic importance of turmeric in the state economy the present entitled study seek to diagnose the questions regarding the existing production status and level of technological adoption, assessing costs and returns structure, intensity of resource use pattern, productivity of resources, possible resource adjustment and constraints hindering turmeric productivity etc. Present study also provide a guide line for making adjustment in the use of farm resources in rational direction and thereby augmenting crop productivity and hence economic viability of turmeric farming.

Objectives of the study

5. To estimate the costs involved and return obtained in turmeric cultivation.
6. To estimate resource use productivity and efficiency of turmeric cultivation.
7. To study the processing cost involved in different stages of turmeric.
8. To examine marketing costs and price spread in different marketing channels.

The present study has been confined to Koraput district of Odisha state which comprises 21 development blocks namely,Bandhugaon, Bhairabsinghpur, Boipariguda, Boriguma, Damonjodi, Dasamantapur, Jeypore, Kakiriguma, Koraput, Koraput town, Kotia, Kotpad, Kundura, Lakshmipur, Machh kund, Nandapur,Narayanpatna, Paua, Pottangi, Simliguda and Sunabeda. In order to keep the study within manageable limits one block namely Nandapur was selected purposively in consultation with officials of District Agriculture Department Koraput.

A list of farmers growing turmeric were prepared in consultation with AAO and AHO further categorized into three size group on the basis of their size of holding viz. small

(up to 2 ha.), medium (2.01 to 4ha.) and large (above 4 ha.)From each size group 20turmeric growers were selected randomly which totaled to 60 in number.

The present study is based on primary data which were collected by survey method using pretested interview schedule and personal interview of the selected respondent's. The data pertains to the agricultural year 2016-17.The data were analyzed in light of objective using cost of cultivation, cost concepts and profitability concept. The Cobb-Douglas production function was used for estimation of resource use efficiency of recommended Turmeric technology by the sample farmers. Opinions of the respondents were also sorted out to identify the constraints in Turmeric production.

Conclusion:

- Total cost per hectare incurred in turmeric production on sample farm was Rs.168021.65 which decreased as the farm size increased. The proportion of operational cost and fixed cost to total cost on sample farm was 80.49 and 19.50 of the total cost was alone contributed by hired and family labours which varied between 28.38 per cent on different farm.
- Cost of cultivation according to various cost concepts (Cost A_1 to Cost C_3) in different size of farms decreased as the farm size increased.
- Net income obtained from turmeric production was Rs.114146per hectare with maximum of Rs. 133359/ha on small farm to Rs.96606 per ha on large farm revealing inverse relations with the farm size. Benefit cost ratio was 1.67 with marginal variations in different size of holdings. Cost of production of turmeric varied from Rs. 2756 to Rs. 3000 with an average of Rs.2871 per quintal revealing on extra ordinary difference between the different size farms.
- The regression coefficient of farm power was positive and non-significant and seed was significant on large group and fertilizers were found significant in case of overall farm while coefficients of irrigation were found significant across all the size of groups.
- Return to scale of large and small farmer was found more than unity indicated increasing return to scale. While in medium farm production increased at decreased rate.
- The system of marketing reveals that the turmeric growers get good share in price paid by processor, exporter and end consumer. Hence there is a need to promote the turmeric cultivation among the farmers so that they can get good earnings. Out of the

three channels of turmeric marketing, third channel i.e. producer-processor-exporter was the more efficient from producer as well as consumer point of view as the producer could get as high as 64.94 per cent of the consumer rupee and marketing channel efficiency index was the higher in channel III (1.76) than channel I (0.89) and channel II (0.41).

Based on the findings of the study some suggestions for higher and equitable production of turmeric are given below:

1. The socio-economic backwardness of farmers of study area is a higher obstacle in acceptance of the improved technology. It is suggested that frequency of extension visits should be increased to encourage more, wider spread and adoption of farm technology.

2. The wide gap between productivity level of turmeric and attainable yields was observed in the study area. Yield gap can be decreased by augmenting the productivity level of turmeric. Thus, sincere efforts be made by the extension personnel to motivate the farmers to adopt non-conventional production technology. Krishi Vigyan Kendra should identify the problems of farmers and feedback and solution of constraints be provided in time to the farmers.

3. Establishment of training and processing centre of turmeric in each block level Government also established and storage in each blocks.

4. Timely supply of fertilizers, seed, and technical knowhow of turmeric of the farmers properly use of available farm resources for increasing production.

5. Processing: Price of dry turmeric with minimal processing fetches more price than raw turmeric. Therefore the farmers need to be encouraged to take up processing b themselves by giving them subsidy and / or loan for establishing the small scale processing unit. The Governments should help the farmers to establishing the small scale mini processing plant, so that farmer will get maximum share in consumer rupee.

6. The role of regulated market committee should be strengthened for marketing of turmeric through provision of better market infrastructure facilities at the RMC level to ensure remunerative prices to the farmers.

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COLLEGE OF AGRICULTURE, OUAT, BHUBANESWAR
DEPARTMENT OF AGRICULTURAL ECONOMICS
SCHEDULE FOR COLLECTION OF PRIMARY DATA FROM "TURMERIC GROWERS"

"Economics of Turmeric production in KORAPUT district of ODISHA"

Schedule no._____contact no._____

I. General information of the respondents:

1. Name:_____Age:_____Education:_____
2. Caste:Gen/OBC/SC/ST/Minorities/Others
3. Association with social organization: ZP/TP/VP/NGO/SHG/Others:
4. Family type: Nucleus/Joint
5. Family Composition: Total_____Male_____Female_____
6. Occupation: Main_____ Subsidiary:_____
7. Total annual income:
   Main_____ Subsidiary_____ Total_____
8. House type: RCC/Pucca/ Kacha/ Temporary shelter
9. No. of years you have been growing Turmeric:

II. Land holding (in ha):_____

Sl No.	Particulars	Irrigated	Dryland	Total
1				
2				
3				
4				
	Total			

If irrigated, sources and availability of irrigation

Sl. No.	Sources	Availability of Water				Adequate/ Inadequate
		Round the year	Kharif	Rabi	Summer	
1	Open well					
2	Bore well					
3	Canal					
4	Tank					

5	Pond					
6	Others					

III. Farm Asset Base

Farm implement	No.	Year of Purchase	Purchase cost(Rs.)	Present value(Rs.)	Junk Value(Rs.)	Life span(Year)
Bullock cart						
Tractor						
Plough						
Harrow						
Pumpset						
Others						

IV. Cost of cultivation of Turmeric

Variety_____ Season_____

Area (in acre)_____ Soil type_____

Land: Dry/Irrigate. If irrigated, method of irrigation_____

No. of irrigation_____

Sources of seed: Own/ Private/ Dept. of Agriculture/ Others, if any

A. Input Use Pattern: (per ha)

Sl No.	Inputs	Quantity/ac	Rate(Rs.)	Amount(Rs.)
1	Seed			
2	Manures			
3	Any other organic input Irrigation charges Electricity Charges			
	Others			

B. Labour utilization pattern(per ha)

Sl No.	Operation	Human labour (man days)				Bullock labour (pair days)	
		Family labour		Hired labour			
		M	F	M	F	O	H
1	Land Preparation						
2	Ploughing						
3	Sowing						
4	Mulching material collection						
5	Mulching						
6	Weeding						
7	Irrigation						
8	Digging						

Wages of labour:

Men……

Women……..

Bullock Pair……..

V. Constraints Faced

Sl No.	Constraints	Rank
1	High cost of labour	
2	Personal obligation with traders	
3	Financial weakness	
4	Lack of technical knowledge	
5	Lack of storage facilities	
6	Low productivity	
7	Non-availability of quality seed	
8	Inadequate market information	
9	Less government priority	