Dynamics and Determinants of Groundnut Value Chain: A case of Nuapada District of Odisha

A Thesis submitted to Orissa University of Agriculture and Technology in partial fulfillment of the requirement for the degree of

MASTERS OF BUSINESS ADMINISTRATION (AGRIBUSINESS MANAGEMENT)

By

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CERTIFICATE I

This is to certify that the thesis entitled **"Dynamics and Determinants of Groundnut Value Chain: A case of Nuapada district of Odisha**" submitted in partial fulfillment of the requirements for the award of the degree of Master of Business Administration (Agribusiness Management) to the Orissa University of Agriculture and Technology is a faithful record of bonafide and original research work carried out by **Sri Jayanarayan Sharma** 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 from various sources during the course of investigation has been duly acknowledged.

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CERTIFICATE II

This is to certify that the thesis entitled **"Dynamics and Determinants of Groundnut Value Chain: A case of Nuapada district of Odisha"** submitted by **Sri Jayanarayan Sharma** to the Orissa University of Agriculture and Technology, Bhubaneswar in partial fulfillment of the requirements for the degree of Master in Business Administration (Agribusiness Management) has been approved/disapproved by the students' advisory committee and the external examiner.

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DECLARATION

I hereby declare that the project report entitled "**Dynamics and Determinants of Groundnut Value Chain: A case of Nuapada district of Odisha**" submitted by me to the Department of Agribusiness Management (ABM), Centre for Post Graduate Studies, OUAT, Bhubaneswar, Odisha, is a bonafide work undertaken by me and it is not submitted by any other university or institute for the award of any degree certificate or published any time before.

Jayanarayan Sharma

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Jayanarayan Sharma

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ABSTRACT

A study was conducted on the value chain analysis of groundnut in Nuapada district of Odisha. The objective was to study the growth of groundnut production, the cost and return in groundnut farming, the major players in groundnut subsector, the opportunities for strengthening of groundnut value chain and the scope in the seed market for improved varieties of groundnut seeds in Nuapada. Data for this study has been obtained from field level household surveys across four blocks of Nuapada district. A questionnaire designed specially according to the objectives. It covers various aspects like socio-economic background of the farmer, land profile, important groundnut varieties cropped, utilization of the produce, marketing of the produce, technology adoption etc. Other information like nutrition management, micro nutrient management, mechanization in groundnut farming etc was also collected. Input and output cost also estimated to know about the costs of cultivation. From the study it is found that the area under groundnut cultivation the state is decreasing over the years because of fluctuating prices and loss of crop due to many agro-biological and climatic factors. However, in Nuapada district it is increasing mainly because of profitability. Special focus should be given to groundnut farmers in assuring minimum support price and procuring the groundnut from the farmers through mandis or societies. As illiteracy is high among farmers which is common in tribal dominated district of Nuapada, proper scope for training should be there. The farmers should be made aware about the new technologies for higher yield. Availability of quality groundnut seeds is a major constraint. In Nuapada, generally the department of agriculture provides seed to the farmers in large scale but timely availability is a serious issue. So there is a need of a system of seed bank where the farmers can deposit their surplus seed and can get the seed whenever they need. In Nuapada, generally the farmers get improved variety of seeds on the basis of land holding status. So tenant farmers are in disadvantage. There is no facility for tenant farmers to get improved varieties of seeds. So organizations involved in facilitating provisioning of improved varieties to the farmers should come up with a system of paper work which can legalize this tenancy system and provide all those facilities to the farmers with less land also.

CHAPTER-1

INTRODUCTION:

Groundnut is considered to be one of the most important oilseed crops globally. The seeds are a good source of edible oil and proteins. The peanut seeds are also consumed directly in roasted form, as butter and in candies etc.

Importance of Groundnut Cultivation:

Groundnut is world's one of the 15^{th} leading food crops. It is widely cultivated and consumed worldwide. It is one of the most important foods in international trade. The cultivation of groundnut has following importance:

- It is a cash crop
- It is a useful rotational crop
- It is a soil erosion resistant crop
- As a legume crop it fixes atmospheric nitrogen and thus maintains the soil fertility
- All parts of this plant can be commercially useful
- Many outputs of groundnut plant can be used as fodder

Economic Importance of Groundnut:

- Groundnut is one of the valuable oilseed crops of India. Since the oil obtained from groundnut is considered of high quality having good source of monounsaturated fatty acid, Oleic acid (46.8 percent), Vit E etc, groundnut oil is intensively used for cooking purposes both as refined oil and vegetable oil.
- Groundnut is widely used for table purpose as a snack. Groundnut is consumed as fresh, roasted, dried, boiled and in many other recipes.
- Groundnut oil is also used in the manufacturing of soaps, beauty creams, medical ointments and creams, paints, lubricants and many other industrial products.

Area under groundnut in India during 2015-16 was 4596.33 thousand hectares with a production of 6733.33 thousand tons and productivity of 1465 kg/hectare. Major groundnut producing states in the country are Gujarat, Rajasthan, Tamil Nadu, Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, West Bengal and Telangana.

Globally India is the second largest producer of groundnut after China. These two countries are also responsible for the highest consumption of groundnut. The major groundnut consuming countries are China, India, Nigeria, United States and Myanmar. European Union countries are the largest consumers of groundnut where the crop is not produced.

The leading groundnut exporting countries are Argentina, Senegal, Nigeria, India, United States, China, Vietnam, South Africa and Zambia. Argentina is the largest exporter of groundnut in the world. The major countries that satisfy their domestic consumption demand by importing groundnuts are Belgium, France, Germany, Ireland, Italy, Netherlands, USA, United Kingdom, Sweden, Indonesia, Canada, Malaysia, Singapore, Philippines and Japan.

Odisha is one of the leading producers of groundnut in the country with an area of 2.09 lakh hectares during 2016-17. The climate of Orissa is conducive for groundnut. It is grown both in rabi as well as kharif season. However, kharif area is limited to about 71 thousand hectares and during rabi season it is grown in about 139 thousand hectares. The productivity of groundnut varies from 1446 kg to 1973 kg/ha respectively for kharif and rabi during 2016-17 with production figures of 102.59 and 274 thousand tons respectively for kharif and rabi seasons. In western belt of Odisha, it is mainly grown in Baragarh, Kalahandi and Nuapada district. Value chain of groundnut is highly constrained because of several issues, viz. availing of quality seeds, poor awareness about improved cultural practices and overall highly volatility in output prices.

During the last decade, area expansion under groundnut in Nuapada district has been observed at an annual compound growth rate of 2.07 percent. Similar trend is also observed for yield and production growth. Area, production and yield of groundnut in the district during 2016-17 was 11 thousand hectares, 17.19 thousand tons and 1561 kg/ha respectively. Value chain of groundnut in the district is highly restrictive and farmers are deprived of their legitimate price. Groundnut farming practices are also primitive thereby farmers are not able to realize the potential yield. Under the above circumstances, this study has been carried out on a vision to explore the major actors having their stakes in value chain of groundnut in the district. So this study has been taken up with the following objectives:

Objective:

- To analyze the growth of groundnut production in the district
- To study the cost and return in groundnut farming in the district
- To identify the major players in the groundnut subsector in Nuapada
- To explore the opportunities for strengthening of groundnut value chain in Nuapada
- To identify the scope in the seed market for improved verities of groundnut seeds in Nuapada

CHAPTER-2

REVIEW LITERATURE:

In this study attempts has been made to review the past studies relevant to the research work and are presented under the following heading.

2.1- Production and yield of groundnut
2.2- Technology adoption in groundnut
2.3- Marketing of groundnut
2.4- Value chain of groundnut

2.1- Production and yield of groundnut:

Thamaraikannan, 2009 in his study reported that in India groundnut was grown over an area of 6.9 million hectares and the total production was 5.3 million tons. Major groundnut growing states were Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra. The other important groundnut growing states were Madhya Pradesh, Rajasthan, Uttar Pradesh and Punjab. Groundnut was majorly cultivated in kharif season (June – Sep) accounting up to 75% and remaining in rabi season (Nov – March). India exported groundnut to Indonesia, Malaysia, the UK, Ukraine, the USA, the Philippines, the Netherlands, Singapore and Sri Lanka.

Sharma et al (2007) mentioned in their book "Edible Oil and Oilseeds Economy of India" that the oilseeds acreage increased significantly during the 1980s and early 1990s mainly because of price support and various oilseeds development programmes launched by the government. However, during 1990s area under oilseeds remained constant at about 25 million ha and declined in some years.

Patel Arun S. (1997) reported the contribution of groundnut to overall farm sector in Gujarat. In terms of groundnut production, India's share was only 29 per cent. Elsewhere groundnuts were consumed directly as nuts just like almonds and cashew nuts and their prices were similar to those.

Shanmugam K. R. (2003) has examined the resources efficiency for groundnut and indicated that the land and labor inputs were significant determents of output of almost all crops in Tamil Nadu. The other cost variable was significant only in irrigated groundnut. The returns to scale parameters for production of almost all crops were close to one (constant returns to scale). There were considerable evidences that the observed outputs of all principal crops selected for the study were less than their respective potential outputs due to technical inefficiency. The average technical efficiency values for raising rice, irrigated groundnut and rain fed groundnut was below 60 per cent, indicating that they could cut input resources up to 40 per cent without any production loss. Thus the sample farms could increase the outputs of crops and thereby farm income through better use of available resources, given the state of technology.

Singh Jitendra (2007) worked on oilseed and noted that the oil seeds are sources of oil, protein, sugar, fatty acids and vitamins. There had been more than five times increased in the production of oil seeds during the period from 1950 to 2005. The total oil seeds production was around 24.84 million tons in India. India's major oil seeds crop is groundnut. It occupied 35.2 per cent area with 28.6 per cent world's production. India ranked first in production of groundnut globally. India was the fourth largest vegetable oil economy in the world next to U.S., China and Brazil.

Talawar (2004) mentioned that groundnut area in India expanded after second half of the 18^{th} century. By 1850, about 1000 hectares was under peanut cultivation in the Madras Presidency of India which doubled in the next decade. Later by 1895, about 70,000 hectares were sown with groundnuts. Between 1910 and 1945, the crop spread from Madras to Gujarat, and gradually to all the way down to the south-west of India. He also mentioned that before the Second World War, groundnut was exported from India as kernels (Shelled) and pod (In-shell). The average annual export of groundnut kernels during the triennium ending 1938-39 was about 40 per cent of total production in the country.

Chand (2011) estimated the instability and regional variations in Indian agricultural output and productivity of major agricultural commodities across states. In groundnut, area instability had decreased from 9.52 to 5.85 per cent during 1951 to 2007 but production instability had doubled from

14.07 to 29.81 from pre to post-WTO period respectively due to higher instability in the groundnut yield in later period. Production instability in a crop depends significantly on the irrigation coverage of a crop which was only 17 per cent in groundnut. The major cause of increase in instability in groundnut yield was the occurrence of frequent and severe droughts during 1994-95 and 2008-09 respectively.

Chavda (2007) revealed that the majority of groundnut growers belong to middle age group followed by 30% of old age and 11.50% young age group. He revealed that 81% of growers were falling under medium level of yield index, where as 10.50% were in low level and 8.50% were in high level yield index.

2.2- Technology adoption of groundnut:

Talawar (2004) and Ibrahim and Eleiwa (2008) in their studies found that chemical fertilizers were largely employed to increase the soil nutrient content for groundnut cultivation. About 10 – 20 kg of ammonium sulfate for nitrogen and 25 – 50 kg of single super phosphate for phosphorus per hectare acre (ha) were recommended fertilizers and 10 – 50 kg of potash for potassium per ha was recommended. Full doses of potash and super phosphate and a half dose of nitrogen were recommended during sowing. The remaining half of the nitrogen was applied during 30 – 40 days after sowing. For soils having high nutrient content the recommended NPK was 30:30:25 and in soils requiring more nutrients the recommended dose was 60:60:50. Gypsum was recommended at the rate of 500 kg/ha to increase the yield of groundnut. Application of micronutrients like zinc, boron and sulfur were recommended for yield improvement.

Virmani and Shurapli (1999) indicated that groundnut productivity in India was low due to moisture stress, poor soil fertility, pests and diseases, and low inputs, and cultivation of the crop on marginal and sub marginal lands. Nearly 80 per cent of the area sown to groundnuts in India was rainfed and relied entirely on summer monsoon rainfall.

Joshi and Bantilan (1998) reported that the development of groundnut production technology in India evolved with the need to enhance groundnut

production and yield to meet the rising demand in the country and to reduce the import of edible oils. In 1986, the Government of India introduced a massive program known as the 'Oilseed Technology Mission', allocating more resources to research and technology transfer activities, and offering remunerative prices to oilseed producers, among other measures.

Ravula and Cynthia (2007) stated that Groundnut Production Technology (GPT) is a package of practices for dry land cultivation of groundnut. It is essentially a natural resource management innovation. The GPT was specifically developed for cultivation of groundnut in dry areas, especially to promote cultivation in summer using an improved package of practices which included improved cultivars, as well as soil, water, and nutrient management options. The GPT encompasses several components related to soil, nutrient, crop, water, and pest management.

The components of the GPT can broadly be divided into:

- Land management: preparation of raised-bed and furrows (BBF) for groundnut production;
- Nutrient management: efficient application of macro and micro-nutrients;
- Improved varieties: high-yielding variety of seeds, proper seed rate and seed dressing/ treatment;
- Insect and pest management: effective control of insects, diseases, and weeds; and
- Water management: use of sprinkler sets to improve efficiency of irrigation.

2.3- Marketing of groundnut:

Jhala M. L. (1997) revealed that the demand for edible oil has increased steadily as a result of rising population; rise in incomes and due to high income elasticity of demand for edible oils. The Government had the full knowledge of the likely trends of the demand and the supply and hence the deficit of edible oils, thanks to the projections made by the National Commission of agriculture (1976) and the Long Term Edible oil plan (1978) of the Government of India. Despite this, there was a total mismatch between the production shortfall measured by the difference between

indigenous production and demand for oils, and the actual imports of edible oils for fairly long periods of time that was from mid seventies to the mid-eighties. The Government could not achieve the goal of price stability of edible oils and oilseeds despite the fact that the imports constituted as large as 40 per cent of domestic production of edible oils during this period. It delayed the very purpose of attaining self-reliance in the oil seeds sector. It was in the year 1988-89 that the irrational import policy was abandoned and as reported earlier, the country registered a quantum jump in import with a nine fold rise in it. Even the area under edible oilseeds which was stagnant around 168 lakh hectors for long prior to 1988-89 registered a 50 per cent rise by the year 1993-94.

Patel Arun S. (1997) examined the prices of oilseed. He compared international prices and domestic prices of edible oils and tried to prove that oilseeds cultivation was inefficient in India and that we should depend on imports more. However, it was forgotten that domestic prices of high quality of oils like groundnut oil, sunflower oil etc. were compared with cheap palm oil prices in the world to put forward this argument.

Ranjana Kumar (2005) reported that there should be reforms in agriculture price policy, taking in to account domestic and world price conditions of agriculture output rather than only on the basis of a measure of production costs.

Velavan C. and Balakrishanan V. (2000) reported that groundnut production not only decides the prices of groundnut oil in any year but also the prices of other major edible oils. So, the efficient utilization of the resources was necessary for increasing the production and productivity of groundnut.

Tyagi V. P. (1993) concluded that the producers got less than 65 percent of the consumer‘s rupee in oilseeds and pulses and the maximum share went to the wholesalers and retailers. They suggested that there was an urgent need for co-operativization of marketing, storage, transport and processing of mustard, arhar and gram.

Ninan (1988) reported that the prices of rapeseed mustard and groundnut oil increased at a compound rate of 8.81% per annum, as against 6% per annum

increase in general price level during the period 1951-52 to 1980-81 in the country.

Kahlon and Gurumurthi (1981) reported that market price structure was more favorable for oilseed crops as compared to that for cereals with price ratio for oilseeds improving by 27 percent over the two periods 1952-53 to 1964-65 and 1967-68 to 1978-79. The study highlighted the volatile character of oilseeds prices in the country as a whole.

2.4- Value chain of groundnut:

Hobbs (1996) indicated that the practice of SCM encompasses the disciplines of economics, marketing, logistics and organizational behavior to study how supply chains are organized and how institutional arrangements influence industry efficiency, competitions and profitability.

Wilson (1996) in his study on supply chain of perishable products in Northern Europe found out that the supermarket chain was more important in the retail marketing of fresh products and he suggested that increased use of supply chain management techniques could increase the margins of the innovative and competitive firms that remain in the chain. Further the inherent cost of distribution networks and channels of fresh produce could be reduced substantially by using supply chain management. The fruit and vegetable supply chain has traditionally been fragmented. Some links had performed well but others had caused bottle necks.

Subha (2004) in a study of managing supply chain concluded that seeking sustainable and defensible competitive advantage had become the concern of every manager who was alert to the realities of the market place. Adding value through differentiation was a powerful means of achieving an edge in the market place. When companies create vision, try to restructure their organizational structure, exercise caution in implementing supply in their organization and it would definitely be able to enjoy a competitive position in the market. By suitably integrating the members of the supply chain and maintaining the information flow within the organization would surely help it to meet the demand in the market place providing satisfaction to the customer.

Presutti and Mawhinney (2009) proposed a contemporary value chain model that reflects the elements that Porter's model did not. Those elements include leadership, corporate culture and the discipline of supply chain management. The supply chain, an important component of the value chain but not synonymous with it, includes all the primary activities of the Porter model. Consolidating those activities into the supply chain component of the contemporary model provides an opportunity to include other elements that are fundamental to value chain success.

CHAPTER-3

Materials & Methodology:

Study of any problem requires an investigation to adopt appropriate methods and procedures in order to arrive at reliable, unbiased and practical conclusions. It describes and clarifies methods used for measuring the dependent and independent variables.

In this chapter, a brief description of the study area, sampling framework, database and method of analysis employed are presented under the following headings.

3.1- Research Problem

3.2- Sources of Data

3.3- Area of research

3.4- Research Deign

3.5- Sampling Technique

3.6- Questionnaire Design

3.7- Collection of Data

3.8- Analytical Techniques

3.9- Constraints

3.1- Research Problem:

Value chain of groundnut in the district is highly restrictive and farmers are deprived of their legitimate price. Groundnut cultural practices are also primitive thereby farmers are not able to realize the potential yield.

3.2- Sources of Data:

Source of Primary Data

Data for this study has been obtained from field level household surveys across four blocks of Nuapada district. Purposive sampling has been used to select the farmers. Data was collected from 91 farmers through a pretested questionnaire from whom 35 were marginal farmers, 34 were small farmers and rest 22 were large farmers. From Boden block 24 farmers were selected from Dargaon, Kulingamal, and Palsada villages. From Khariar block, data from 22 farmers were collected from Bhojpur, Chhata and Mandosil villages and from Komna block, 23 farmers were selected from Dharamsagar, Komna and Palsipani village. From Sinapali block 23 farmers were selected from Hatibandha, Jogenpadar and Kapsi village.

Table 3.1: Sampling framework

	Marginal Farmers Nos. (%age)	***Small Farmers Nos. (%age)***	***Large Farmers Nos. (%age)***	***Total***
Nuapada	***35 (38.5)***	***34 (37.4)***	***22 (24.2)***	***91 (100)***
BODEN	**6 (6.6)**	**12 (13.2)**	**6 (6.6)**	**24 (26.4)**
DARGAON	2 (2.2)	5 (5.5)	3 (3.3)	10 (10.10)
KULINGAMAL	3 (3.3)	5 (5.5)	3 (3.3)	11 (12.1)
PALSADA	1 (1.1)	2 (2.2)	-	3 (3.3)
KHARIAR	**5 (5.5)**	**8 (8.8)**	**9 (9.9)**	**22 (24.2)**
BHOJPUR	4 (4.4)	4 (4.4)	2 (2.2)	10 (11)
CHHATA	1 (1.1)	4 (4.4)	4 (4.4)	9 (9.9)
MANDOSIL	-	-	3 (3.3)	3 (3.3)
KOMNA	**13 (14.3)**	**8 (8.8)**	**1 (1.1)**	**22 (24.2)**
DHARAMSAGAR	7 (7.7)	2 (2.2)	-	9 (9.9)
KOMNA	3 (3.3)	-	-	3 (3.3)
PALSIPANI	3 (3.3)	6 (6.6)	1 (1.1)	10 (11)
SINAPALI	**11 (12.1)**	**6 (6.6)**	**6 (6.6)**	**23 (25.3)**
HATIBANDHA	3 (3.3)	2 (2.2)	5 (5.5)	10 (11)
JOGENPADAR	-	3 (3.3)	-	3 (3.3)
KAPSI	8 (8.8)	1 (1.1)	1 (1.1)	10 (11)

Source of Secondary Data

The secondary data on area, production and productivity of groundnut for different groundnut producing states in India and for different districts of Odisha and other relevant information for the study were gathered from the reference books, reports, bulletin and periodicals published by different organizations, institutes and agencies. The information regarding recommended groundnut production technology was compiled after discussions with many persons from various organizations like ICRISAT & Department of Agriculture.

3.3- Area of Research:

Nuapada district was selected purposively. The south-west monsoon is the principal source of rainfall in the district. Average annual rainfall of the district is 1286.40 mm. About 75% of the total rainfall is received during the period from June-September. The average monthly rainfall 107.20 mm, the number of rainy days is about 60 days per year. Droughts are quite common in the district. As the district falls in the rain shadow region the rainfall is very erratic. Analysis of 40 years of rainfall data from 1966 to 2006 reveals that the rainfall is uneven with maximum rainfall (1663mm) in 1990 and minimum (612mm) in 1974. The climate of the district is subtropical with hot and dry summer and pleasant winter. The summer season extends from March to middle of June followed by the rainy season from June to September. The winter season extends from November till the end of February.

3.4- Research Design:

To reach to the stated objective first of all data were collected from 91 farmers in a face to face communication with the help of questionnaire designed specially according to the objectives. It covers various aspects like socio-economic background of the farmer, land profile, important variety cropped, utilization of the produce, marketing of the produce, technology adoption etc. Other information like nutrition management, micro nutrient management, mechanization used etc was also collected. Input and output cost also collected to know about the costs of cultivation.

3.5- Sampling Technique:

The method of sampling was purposive judgment sampling, where target sample members were to be considered and here the groundnut farmers were the targeted sample respondents.

The sampling techniques are described as follows.

- Selection of the district

  Nuapada district was selected for the study.

- Selection of Block

  Komna, Boden, Khariar and Sinapali blocks having higher concentration of groundnut area were selected for the study.

- Selection of Village

  From each block, 3 villages were selected as per the area concentration. The basis was adoption of improved variety of groundnut. Villages were chosen where improved varieties of groundnut were grown and some villages where there was no reach of improved variety of the groundnut.

- Selection of Groundnut farmer

  To make the study more appropriate farmers from various size classes were selected for canvassing. All together 35 marginal, 34 small and 22 large farmers were selected purposively.

3.6- Questionnaire Design:

The questionnaire used for the study had following parts

- Socio-economic background of the sample farmer/household
- Land portfolio of the sample household and area allocation to Groundnut:
- The most important variety grown during kharif & rabi season
- Technology adoption in Groundnut.
- Utilization of crop production
- Marketing of groundnut output during 2016-17 season:
- Marketing cost of groundnut
- kind of incentives/subsidies received from Government/other agencies
- Sources of credit
- Input-output

3.7- Collection of Data:

The basic information about the area of study and overall farming practices were collected from the field officers of ICRISAT and Department of Agriculture and many villagers. The primary data collected from the farmers with the help of the pretested questionnaire. All the selected farmers were interviewed individually. The aim was to know about the farming practices and the adoption of improved varieties with their marketing reach and cost of cultivation.

3.8- Analytical Techniques:

In this study, tabular analysis was adopted to compile the general characteristics of the sample farmers, the resource structure, cost structure, returns, profits and opinions of farmers regarding the problems in production. Simple statistics like averages and percentages were used to compare, contrast and interpret results in an appropriate way.

a) Estimation of the growth rates

For the purpose of summary judgments as to the growth of area, yield and production of groundnut cultivation in Nuapada district of Odisha, computation of growth rate is the most prevalent method. Estimates of trend by computing growth rates of area and production of groundnut cultivation during a span of time in major groundnut producing districts of Odisha is not only of academic interest, but are of considerable significance to the policy makers. The method of computation should be such which uses the entire series of observations. The basic approach is to specify the variable under study as a function of time. Usually, the growth in any period is not independent of the value of the variable in the previous period. Therefore, the compound growth model is utilized for the purpose of the present study.

Compound Annual Growth Model

The compound annual growth rate has been used to understand the direction and extent of groundnut cultivation over the years in different districts of Odisha, for estimating the compound growth rates, the following growth model is used:

In Y = In a + t In b+u ……………………………………(1)

Where Y= area/ production/ yield
t = time variable
u= disturbance term
"a" & "b" are the parameters to be estimated from the sample observation.

Compound annual growth rate= (AntiIn b-1) X 100 ……………(2)

Compound annual growth rate is expressed in percentage per annum and separate regressions have been run for different groundnut producing states as well as for major groundnut producing districts of Odisha.

b) Coefficient of variation

A coefficient of variation is a statistical measure of the dispersion of data points in a data series around the mean. It is calculated as follows:

C.V.=Standard deviation/ Mean

The coefficient of variation represents the ratio of the standard deviation to the mean and it is useful statistic for comparing the degree of variation from one data series to another, even if the means are drastically different from one another. It is calculated as follows:

3.9- Constraints:

- Time was the major constrain to cover a large number of groundnut farming households in different groundnut producing blocks of Nuapada.
- Almost majority of the farmers are illiterate

CHAPTER-4

RESULTS AND DISCUSSION:

4.1- Status of Groundnut in India

Out of nine major oilseed crops grown in India, groundnut accounts for about 45 percent of total cropped area under oilseeds and 55 percent of total area under oilseeds production.

Gujarat, Andhra Pradesh, Tamil Nadu, Rajasthan, Karnataka, Maharashtra, Madhya Pradesh, Uttar Pradesh are the major groundnut producing states of India. China and India together are the world's leading groundnut producers accounting for nearly 60 percent of the production and 52 percent of the cropped area. India produced about 6.7 million tons of groundnut with the productivity level of 1465 kg per hectare during 2015-16.

Table 4.1 Area, production and yield of Groundnut during 2014-15 and 2015-16 in major groundnut producing states of India

States	2014-15			2015-16		
	Area '000 Hectares	Production '000 Tons	Yield Kg/Hectare	Area '000 Hectares	Production '000 Tons	Yield Kg/Hectare
Gujarat	1401 (29.38)	3018 (40.77)	2154	1414 (30.76)	2339.10 (34.74)	1654
Andhra Pradesh	874 (18.33)	493 (6.66)	564	775.00 (16.86)	801.00 (11.90)	2183
Tamil Nadu	336.5 (7.06)	926.4 (12.52)	2753	346.60 (7.54)	892.30 (13.25)	2574
Rajasthan	500.8 (10.5)	1011.2 (13.66)	2019	516.85 (11.24)	1048.72 (15.58)	2029
Karnataka	654.0 (13.71)	502.0 (6.78)	768	570.00 (12.40)	395.00 (5.87)	693
Maharashtra	327.0 (6.86)	379.0 (5.12)	1159	309.00 (6.72)	334.00 (4.96)	1081
Madhya Pradesh	231 (4.84)	370 (5.00)	1602	236 (5.13)	331.56 (4.92)	1405
Uttar Pradesh	98(2.06)	84(1.13)	857	97 (2.11)	65 (0.97)	670
Odisha	48.8(1.02)	61.9(0.84)	1262	51.21(1.11)	56.16 (0.83)	1097
India	**4768.7 (100.00)**	**7401.7 (100.00)**	**1552**	**4596.33 (100.00)**	**6733.33 (100.00)**	**1465**

(Directorate of Economics and Statistics, Department of Agriculture Cooperation and Farmers Welfare)

Note: Figures in the parentheses indicate percentages to the total

4.2- Status of Groundnut in Odisha

AREA UNDER GROUNDNUT IN ODISHA:

In Odisha, Jajpur, Bargarh, Ganjam, Puri, Kalahandi and Nuapada are the leading districts with high area allocation under groundnut cultivation. In fact, the area under groundnut has decreased due to many reasons like fluctuating prices, irrigation problem, low yield and drought etc. The following facts show that there is a need of giving priority to groundnut cultivation by providing support and various extension services to the farmers. Jajpur district had the highest area allocation of 29.79 thousand hectares during TE 2016-17 while Nuapada had 14.13 thousand hectares of land under groundnut during the same period.

Table 4.2 Triennium averages (TE) of area under groundnut in different districts of during since 1996-97 to 2016-17('000 ha)

Districts	Triennium ending						
	1998-99	2001-02	2004-05	2007-08	2010-11	2013-14	2016-17
Balasore	6.78	8.30	7.75	11.11	14.00	16.21	11.28
Bhadrak	1.07	1.42	1.21	1.25	1.63	1.90	0.83
Bolangir	14.61	11.10	8.67	9.62	10.51	9.67	9.57
Sonepur	2.56	1.69	1.73	1.56	2.34	4.62	2.80
Cuttack	11.25	7.29	8.38	9.33	9.61	11.12	7.64
Jagatsinghpur	10.36	9.05	7.66	6.96	8.19	8.40	7.07
Jajpur	29.82	33.24	32.67	32.43	31.22	31.66	29.79
Kendrapara	14.68	12.43	10.55	10.30	10.14	10.16	9.04
Dhenkanal	20.25	18.03	15.62	12.31	11.70	11.66	11.70
Angul	13.26	10.90	11.55	10.63	9.82	10.85	11.53
Ganjam	17.53	16.53	15.20	22.81	21.85	23.69	19.13
Gajapati	2.64	1.92	1.60	1.66	1.85	2.29	2.44
Kalahandi	14.60	10.70	9.42	12.94	14.56	14.67	15.45
Nuapada	12.21	14.05	9.28	10.14	11.75	13.23	14.13
Keonjhar	4.92	3.61	2.39	2.60	2.91	3.15	3.33
Koraput	0.38	0.45	0.44	0.63	1.03	1.39	1.28
Malkangiri	12.08	16.40	13.39	11.38	15.85	18.41	11.70
Nawarangpur	1.67	1.35	1.61	1.76	1.30	0.92	1.28
Rayagada	0.93	0.85	1.03	1.10	1.05	1.21	1.46
Mayurbhanj	4.54	3.88	3.97	6.66	7.56	8.69	8.68
Kandhmal	2.45	1.40	1.40	1.19	0.88	1.40	2.09
Boudh	0.27	0.29	0.39	0.64	0.54	0.54	0.50
Puri	13.84	10.21	9.48	10.64	13.09	16.43	16.45
Khorda	2.84	2.17	1.59	3.45	4.46	3.21	1.36
Nayagarh	1.38	0.95	0.98	0.97	0.72	0.56	0.88
Sambalpur	1.06	0.65	0.71	1.43	1.18	1.00	1.07
Bargarh	40.75	28.15	30.59	33.86	31.24	27.15	21.08
Deogarh	0.80	0.76	1.15	2.25	1.51	1.62	1.77
Jharsuguda	1.17	0.95	1.47	1.93	2.35	1.78	1.17
Sundergarh	5.77	4.65	2.90	3.02	4.19	4.50	3.59
Odisha	266.42	233.37	214.79	236.56	249.04	262.08	230.11

PRODUCTION OF GROUNDNUT

In Odisha, Jajpur, Puri, Ganjam, Bargarh and Kalahandi districts are leading in groundnut production front. In a broader view, the total production of groundnut in the state has decreased over years mainly because of decline in area. The reason is farmers shifting from groundnut cultivation to other profitable crops. Value chain of groundnut is highly restrictive and farmers are deprived of their legitimate price. Groundnut cultural practices are also primitive thereby farmers are not able to realize the potential yield. The production of groundnut was highest in Jajpur (58.32 thousand tons) and Nuapada produced 23.27 thousand tons during TE 2016-17.

Table 4.3 Triennium averages (TE) production of groundnut in different districts of during since 1996-97 to 2016-17('000 tons)

Districts	Triennium ending						
	1998-99	2001-02	2004-05	2007-08	2010-11	2013-14	2016-17
Balasore	8.39	14.19	10.90	18.77	21.56	31.12	22.22
Bhadrak	1.66	2.13	2.15	2.63	2.98	4.20	1.80
Bolangir	13.69	10.65	10.02	14.18	17.7	17.02	16.70
Sonepur	3.81	2.93	3.07	3.27	5.63	9.26	5.66
Cuttack	10.67	9.11	11.00	15.81	18.60	20.87	14.65
Jagatsinghpur	9.45	12.69	14.71	16.67	16.11	15.68	13.58
Jajpur	27.92	51.93	52.03	58.29	55.15	58.96	58.32
Kendrapara	15.58	20.16	21.32	24.09	21.93	19.28	16.34
Dhenkanal	19.36	22.60	16.51	17.41	19.52	20.48	21.15
Angul	14.30	13.10	10.40	12.58	15.57	20.33	20.57
Ganjam	19.03	19.93	19.73	33.72	36.57	37.22	31.04
Gajapati	3.32	2.24	2.17	2.13	2.59	3.52	3.84
Kalahandi	16.90	13.86	13.90	20.70	25.26	28.22	29.28
Nuapada	12.87	12.16	10.45	15.63	17.55	22.71	23.27
Keonjhar	6.39	4.30	2.23	2.60	2.97	3.62	4.87
Koraput	0.27	0.39	0.45	0.73	1.33	1.84	1.65
Malkangiri	13.78	26.36	30.15	25.73	33.27	34.25	21.26
Nawarangpur	1.41	2.06	2.15	2.47	1.84	1.08	1.73
Rayagada	0.56	0.95	1.44	1.56	1.71	1.60	2.13
Mayurbhanj	4.83	4.53	4.69	7.59	9.37	14.70	16.03
Kandhmal	2.69	1.30	1.92	1.90	1.42	2.07	3.08
Boudh	0.27	0.32	0.47	1.10	0.92	0.89	0.82
Puri	18.19	15.68	19.45	24.61	27.30	34.29	34.32
Khorda	2.82	2.91	2.06	6.21	9.08	5.30	2.42
Nayagarh	1.70	1.17	1.25	1.27	1.17	0.97	1.37
Sambalpur	1.41	0.64	0.69	1.69	1.61	1.50	1.70
Bargarh	46.05	29.27	31.00	41.47	44.49	37.53	29.64
Deogarh	0.95	0.88	1.19	2.83	2.09	2.47	2.63
Jharsuguda	1.33	0.98	1.24	2.24	3.17	2.23	1.47
Sundergarh	7.87	6.01	3.01	3.55	6.07	7.12	5.49
Odisha	287.12	307.41	301.73	383.40	424.53	460.35	409.03

PRODUCTIVITY OF GROUNDNUT:

In the state, Bhadrak, Puri, Sonepur, Balasore and Jajpur lead in productivity of groundnut. Gradually the productivity of groundnut in Odisha is increasing because of use of improved varieties as well as monetized inputs like fertilizers and pesticides. Access to improved variety seeds, fertilizers and various other farm equipments have made this possible. Bhadrak had the highest yield of 2160 kg/ha during the TE 2016-17 whereas, Nuapada achieved a yield of 1647 kg/ha.

Table 4.4 Triennium averages (TE) of yield of groundnut in different districts of during since 1996-97 to 2016-17(kg/ha)

Districts	Triennium ending						
	1998-99	2001-02	2004-05	2007-08	2010-11	2013-14	2016-17
Balasore	1237	1709	1407	1689	1540	1920	1970
Bhadrak	1556	1498	1760	2098	1830	2212	2160
Bolangir	937	959	1155	1474	1684	1761	1745
Sonepur	1489	1728	1774	2098	2401	2006	2021
Cuttack	948	1249	1313	1695	1936	1877	1917
Jagatsinghpur	913	1402	1919	2395	1967	1868	1919
Jajpur	936	1562	1592	1797	1766	1862	1958
Kendrapara	1061	1622	2021	2339	2163	1899	1807
Dhenkanal	956	1254	1057	1414	1688	1757	1807
Angul	1079	1201	900	1183	1585	1874	1784
Ganjam	1086	1206	1398	1479	1673	1571	1623
Gajapati	1259	1166	1350	1288	1402	1536	1577
Kalahandi	1158	1295	1475	1600	1735	1924	1896
Nuapada	1054	866	1127	1542	1494	1716	1647
Keonjhar	1300	1191	931	1001	1021	1149	1461
Koraput	702	859	1019	1153	1294	1329	1288
Malkangiri	1141	1729	2251	2260	2099	1861	1817
Nawarangpur	846	1527	1337	1404	1409	1173	1349
Rayaada	599	1117	1401	1411	1632	1329	1465
Mayurbhanj	988	1167	1182	1140	1240	1692	1847
Kandhmal	1099	929	1372	1589	1616	1476	1470
Boudh	1000	1080	1200	1714	1698	1642	1623
Puri	1315	1536	2051	2312	2086	2088	2086
Khorda	991	1345	1293	1801	2034	1652	1775
Nayagarh	1235	1232	1285	1301	1625	1737	1561
Sambalpur	1334	985	973	1177	1362	1508	1584
Bargarh	1130	1040	1014	1225	1424	1382	1406
Deogarh	1183	1154	1027	1256	1379	1520	1489
Jharsuguda	1131	1032	847	1161	1349	1257	1254
Sundergarh	1365	1292	1040	1176	1450	1582	1527
Odisha	1078	1317	1405	1621	1705	1757	1758

COMPOUND GROWTH RATES OF AREA, PRODUCTION AND PRODUCTIVITY:

In Odisha, the area under groundnut has decreased by 0.39% during 1995-96 to 2016-17 whereas; the production of groundnut has increased by 2.09 percent mainly because of increase in the productivity by 2.49 percent. Nuapada registered compound growth of 0.37 percent, 3.12 percent and 3.50 percent respectively for area, productivity and production during the period from 1995-96 to 2016-17.

Table 4.5 Compound growth rates of area, production and productivity of groundnut in different districts of Odisha during 1995-96 to 2016-17

Districts	Area	Productivity	Production
Balasore	3.70	1.61	5.37
Bhadrak	0.12	2.34	2.46
Bolangir	-1.88	3.71	1.77
Sonepur	2.51	1.86	4.42
Cuttack	-0.88	3.42	2.51
Jagatsinghpur	-1.94	3.16	1.16
Jajpur	-0.22	3.59	3.36
Kendrapara	-2.89	2.10	-0.84
Dhenkanal	-3.30	3.84	0.42
Angul	-0.77	3.33	2.53
Ganjam	1.18	2.31	3.52
Gajapati	-0.09	1.43	1.34
Kalahandi	1.43	2.51	3.98
Nuapada	0.37	3.12	3.50
Keonjhar	-2.18	0.10	-2.08
Koraput	8.06	2.96	11.25
Malkangiri	1.23	1.95	3.21
Nawarangpur	-1.75	0.92	-0.85
Rayagada	2.35	3.57	6.02
Mayurbhanj	4.83	2.62	7.58
Kandhmal	-1.73	1.81	0.05
Boudh	4.52	3.38	8.05
Puri	1.42	2.26	3.71
Khorda	-1.06	3.05	1.95
Nayagarh	-3.58	1.73	-1.91
Sambalpur	0.85	1.59	2.45
Bargarh	-2.60	1.32	-1.32
Deogarh	5.14	1.55	6.77
Jharsuguda	1.53	1.16	2.71
Sundergarh	-2.15	0.93	-1.25
Odisha	-0.39	2.49	2.09

4.3- Profile of sample respondents

Socio-economic profile of sample groundnut farmers is presented in Table 4.6.

Table 4.6 Profile of sample respondents

NUAPADA	Marginal	Small	Large	Overall
1. Caste composition				
OBC	20 (22)	15 (16.5)	10 (11)	45 (49.5)
SC	3 (3.3)	3 (3.3)	1 (1.1)	7 (7.7)
ST	12 (13.2)	15 (16.5)	10 (11)	37 (40.7)
GEN	0 (0)	1 (1.1)	1 (1.1)	2 (2.2)
2. Age wise classification				
1. (15-40)	17 (18.7)	18 (19.8)	10 (11)	45 (49.5)
2. (41-60)	14 (15.4)	12 (13.2)	11 (12.1)	37 (40.7)
3. (>60)	4 (4.4)	4 (4.4)	1 (1.1)	9 (9.9)
3. Avg. Age	46.2 (50.7)	44 (48.4)	41.9 (46.1)	44.3 (48.7)
4. Avg. Yrs. Of Education	6.1 (6.7)	5.5 (6)	8.3 (9.1)	6.4 (7.1)
5. Education class				
1. (No formal education)	5 (5.5)	8 (8.8)	2 (2.2)	15 (16.5)
2. (1-4)	8 (8.8)	7 (7.7)	2 (2.2)	17 (18.7)
3. (4-10)	19 (20.9)	15 (16.5)	12 (13.2)	46 (50.5)
4. (10-12)	2 (2.2)	4 (4.4)	5 (5.5)	11 (12.1)
5. (>12)	1 (1.1)	0 (0)	1 (1.1)	2 (2.2)

Note: Figures in parentheses are percentage to column total

The table reveals that OBC, SC, ST and general caste farmers constituted 49.5 percent, 7.7 percent, 40.7 percent and 2.2 percent of the total sample size respectively. About 49.5 percent of the respondents were in the age group between 15 to 40 and 40.7 percent in between 41 to 60. About 10 percent of the respondents had age above 60. The average age of the respondent farmers was 44 years. The average year of education of the respondents was 6.4 i.e. about standard 6. About 16.5 percent of the respondents were found to be illiterate, 19 percent had qualification up to standard 4, 50.5 percent had qualification varied from standard 4 to 10. About 12 percent were found to have higher secondary education.

4.4- Occupational status and average family labour contribution

Table 4.7 Occupational status and average family labour contribution

Particular	Marginal	Small	Large	Overall
Primary occupations				
Business	1 (1.1)	2 (2.2)	-	3 (3.3)
Farming	33 (36.3)	32 (35.2)	22 (24.2)	87 (95.6)
Service	1 (1.1)	-	-	1 (1.1)
Secondary occupations				
Business	-	1 (1.1)	-	1 (1.1)
Caste occupation	-	1 (1.1)	-	1 (1.1)
Farm labour	26 (28.6)	10 (11)	1 (1.1)	37 (40.7)
Farming	2 (2.2)	2 (2.2)	-	4 (4.4)
Livestock	1 (1.1)	14 (15.4)	12 (13.2)	27 (29.7)
Non-farm labour	5 (5.5)	2 (2.2)	-	7 (7.7)
Pension	-	1 (1.1)	-	1 (1.1)
Service	-	1 (1.1)	2 (2.2)	3 (3.3)
Others				
Business	-	-	1 (1.1)	1 (1.1)
Farm labour	4 (4.4)	1 (1.1)	-	5 (5.5)
Livestock	1 (1.1)	3 (3.3)	-	4 (4.4)
Non Farm Labour	24 (26.4)	9 (9.9)	-	33 (36.3)
Pension	1 (1.1)	1 (1.1)	-	2 (2.2)
Average male family labour availability	1.69	1.71	2.45	1.88

Note: Figures in the parentheses indicate percentage to the total

Farming was the primary occupation for more than 95 percent of the ground farmers. About 41 percent were engaged in off farm wage labour earning and about 30 percent had livestock as secondary occupation. Nonfarm labour as secondary occupation was reported by about 36 percent of the respondents.

Maximum respondents had farm labour as their secondary occupation. Secondary occupation also includes livestock rearing, nonfarm labour wage earming etc. The table also reveals about their other occupations.

4.5- Distribution of farmers according to farm size

Table 4.8 Distribution of farmers according to farm size

Farm types	Marginal	Small	Large	Overall
Numbers	35	34	22	91
(Percentage)	(38.5)	(37.4)	(24.2)	(100)

Note: Figures in parentheses are percentage to column total

Out of 91 respondents 38 percent were marginal farmers followed by small (37 percent) and rest 24 percent were large farmers.

4.6- Land holding pattern of sample farmers

From the Table 4.9, it can been seen that an average of about 4.5 acres of land were owned by the farmers with only about 0.2 acre was leased in & 0.1 acre of overall land holding belongs to leased out land. Overall operated land was 4.7 acre. On an average operated land by marginal, small and large farmers were 1.7, 4.2 and 8.8 acres respectively as kharif rainfed.

On an average 1.5 acre of owned land was feasible for groundnut in the studied area during 2016-17. Overall an area of 2 acres of land was found to be feasible for groundnutcultivation.

Table 4.9: Land holding pattern of sample farmers

Average Of the below Particulars	Marginal Farmers				Small Farmers				Large Farmers				Total
	Kharif Irri.	Rabi Irri.	Kharif Rainfed	Rabi Rainfed	Kharif Irri.	Rabi Irri.	Kharif Rainfed	Rabi Rainfed	Kharif Irri.	Rabi Irri.	Kharif Rainfed	Rabi Rainfed	
Own Land	1.5	1.5	1.7	1.2	-	4.0	4.3	4.2	20.0	20.0	7.3	9.8	4.5
Leased in Land	0.0	0.0	0.0	0.0	-	0.0	0.0	0.2	0.0	0.0	1.5	0.4	0.2
Leased Out Land	0.0	0.0	0.0	0.0	-	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.1
Total Operated Land	1.5	1.5	1.8	1.2	-	4.0	4.2	4.2	20.0	20.0	8.8	10.2	4.7
Area Feasible for Groundnut	0.6	0.5	0.8	0.7	-	1.5	1.3	1.4	10.0	4.0	1.9	2.9	1.5
Feasible area under Own Land	0.6	0.5	0.8	0.7	-	1.5	1.3	1.2	10.0	4.0	1.5	2.5	1.4
Feasible area under Leased in Land	-	-	-	-	-	-	-	2.0	-	-	1.3	4.0	2.0
Share Percentage of Tenancy	-	-	-	-	-	-	-	50.0	-	-	-	50.0	50.0
Fixed Rent for Tenancy	-	-	-	-	-	-	-	-	-	-	2000.0	-	2000.0
Increase in Area	-	-	1.0	-	-	3.0	2.0	2.0	-	-	2.7	-	2.2
Total operational area	1.5	1.5	1.7	1.2	-	4.0	4.2	4.2	20.0	20.0	8.8	10.2	4.7

4.7- Income profile of the sample farmers from various sources

Table 4.10 Income profile of the sample farmers from various sources

Row Labels	Marginal Farmer	Small Farmer	Large Farmer	Total
Business	3428(5)	9852(13)	3181(3)	5769(6)
Caste based profession		588(0.5)		219(0.24)
Farm labour	11585(16)	3250(4)	681(0.5)	5835(6)
Livestock	9900(13)	10911(14)	13590(11.5)	11170(12)
Non Farm Labour	21285(29)	6367(8)		10565(11)
Service	6171(8)	2117(3)	2672(2)	9626(10)
Crops	14514(20)	42397(56)	98090(83)	45137(50)
PENSION	6617(9)	317(0.5)		2633(3)
Nuapada Avg. Income	73500(100)	75799(100)	118214(100)	90954(100)

Note: Figures in the parentheses indicate percentage to the total

As it is seen in the table 4.10, nonfarm wage income constituted highest share of total income in case of marginal farmers (29 percent) followed by farm income (20 percent), farm labour(16%), livestock(13%), pension(9%) and service(8).

In case of small farmers, farm income constituted highest share of total income (56 percent) followed by livestock, business, nonfarm labour, farm labour, service and pension.

Farm income constituted highest share of 83 percent to total income in case of large farmers followed by livestock, business and service.

Overall farm income constituted 50 percent of the total income followed by livestock (12 percent), nonfarm wage earning (11 percent) and service (10 percent).

4.8- Total area and yield of ground varieties grown during kharif and rabi, 2016-17

Table 4.11 Total area and yield of ground varieties grown during kharif and rabi, 2016-17

Varieties	Kharif			Rabi		
	Area	Production	Yield	Area	Production	Yield
AK 12-24	7 (10%)	3800	543	11.1 (16%)	12000	1081
DALUA	1 (1%)	475	475	3 (4%)	1750	583
Devi	31.2 (40%)	16600	532	12.5 (19%)	7350	588
Local	12.9 (17%)	3495	271	20.8 (31%)	10650	512
MUNGI	2 (2%)	270	135	15 (22%)	8100	540
Unidentified	23.3 (30%)	7040	302	5.5 (8%)	2700	491
Total	77.4	31680	409	67.9	42550	627

Table 4.11, reveals area allocation and yield of different varieties of groundnut cultivated by the farmers of Nuapada during Kharif and Rabi 2016-17. In kharif season, Devi variety had the highest area allocation of 40 percent with a yield of 532 kg/ha followed by unidentified varieties which had area allocation of 30 percent with a yield of 302 kg/ac. Local varieties still constituted 17 percent of area with a yield of 271 kg/ac. Another local variety (spreading type) had about 2 percent area with a meager yield of 135 kg/ac. AK 12-24 had the highest yield of 543 kg/ac during kharif. During rabi, area allocated under local varieties contributed the highest (31 percent), followed by Mungi (22 percent), Devi (19 percent) and AK-12-24(16 percent). The yield of AK 12-24 was highest at 1081 kg/ac followed by Devi (588 kg/ac)

The average productivity of groundnut in kharif was 409 kg per acre and that of rabi was 626 kg.

4.9- Sources of groundnut seeds, average quantity of seed used per acre, average price of groundnut seed

Table 4.12 Sources of groundnut seeds, average quantity of seed used per acre, average price of groundnut seed

SOURCE_OF_SEED	Marginal Farmers	Small Farmers	Large Farmers	Total
Nuapada	38.0	38.0	24.0	100.0
ICRISAT	26.3	13.2	33.3	23.0
OSCC	26.3	26.3	12.5	23.0
Own harvest	26.3	39.5	8.3	27.0
Seed traders	15.8	13.2	37.5	20.0
Fellow farmer	5.3	7.9	8.3	7.0
Av. Quantity of seed purchased by the farmers(kg)	44.5	67.4	148.3	78.1
Av. Price of seed used(per kg)	33.9	38.4	34.3	35.6
C.V. of seed price	109.1	99.1	93.6	100.7

Table no 4.12, reveals that in Nuapada, about 27 percent of the farmers used their own seeds. In many cases farmers do farming in kharif for the seed and store the produce for cultivation in rabi season. ICRISAT contributed 23 percent towards the seed and it also facilitated the farmer in procurement of Devi variety seeds through OSSC. There are very few traders in Nuapada. In Nuapada there are no fix traders for groundnut seed. Many farmers get seed for their farming from other farmers. Fellow farmers contributed 7 percent of the total seeds used by the groundnut growers. High coefficient of variation (C.V.) in seed prices as revealed from the table indicates that there was high instability of groundnut seed prices in Nuapada district.

4.10- Traits for adoption of improved groundnut varieties

Table 4.13 Traits for adoption of improved groundnut varieties

Among all the varieties grown in Nuapada, in kharif, AK-12-24 has been grown since 13.7 years because of its traits like higher market demand, high adaptability to local condition and high yield. In fact while discussion with farmers, it was revealed that there was high demand for AK 12.24. However, scarce availability and reliability of the seeds of AK 12.24 was too common. Mungi variety has been grown for the last 7 years because of its traits like easy availability of seed, its higher adoption to local condition and its disease and pest resistant quality.

Among all the varieties grown in Nuapada, in rabi, AK-12-24 has been grown since 15.8 years because of its traits like higher easy availability of seed, its high adoption to local condition and high yield. Dalua variety has been grown by the farmers since last 17 years because of its traits like good taste, its higher adoption in local condition and its disease and pest resistant quality.

Table 4.13 (Traits for adoption of improved groundnut varieties during kharif & rabi season)

	Average years since adoption	Attractive kernel colour	Bolder grain	Can be used in Rabi season	DEMANDED BY OSSC	Determinate	Disease-Pest Resistant	Drought resistant	Easy availability of seed	Good demand for confectionary	Good taste	High market demand	High oil content	High yield	Highly adoptable to local condition	Less weed growth	recomanded by VAW	Short duration
Nuapada																		
kharif																		
AK 12-24	13.7	0	2	0	0	0	1	0	3	0	0	3	1	5	3	0	0	0
Dalua		0	0	0	0	0	3	2	1	0	1	2	0	0	2	0	0	1
Devi	1.6	0	0	0	0	0	2	4	4	0	1	4	0	12	4	0	0	2
LOCAL	15.2	0	0	0	0	0	6	5	3	0	0	2	0	3	4	0	0	0
MUNGI	7.0	2	0	0	0	0	7	1	5	0	0	3	2	1	8	2	0	1
Rabi-summer																		
AK 12-24	15.8	0	1	0	0	0	1	0	3	0	0	0	0	4	2	0	0	0
Dalua	17.0	1	0	0	0	0	5	1	2	0	2	0	0	0	4	0	0	1
Devi	2.0	0	0	0	0	0	4	6	3	0	3	0	0	9	1	0	0	1
LOCAL	13.0	0	0	0	0	0	3	2	7	0	0	2	1	3	6	4	0	0
MUNGI	12.9	0	2	0	0	0	2	0	5	1	0	0	1	2	3	0	0	0

4.11- Marketed surplus of groundnut

Table 4.14 Marketed surplus of groundnut (kgs)

Nuapada	Kharif	Rabi	Total
Average of GRAIN OUTPUT	546.2	1013.1	742.3
Average of CONSUMED	44.0	43.9	88.0
Average of OTHER USES	30.2	50.4	80.6
Average of WAGE PAYMENT	21.8	29.3	51.1
Average of OWNSEED	30.9	36.1	67
Average of SOLD AS SEED	235.7	102.1	337.8
Average of SEED PRICE(RS/KG)	65.0	60.0	63.1
Average of SOLD AS POD	204.9	751.3	956.2
Average of POD PRICE(RS/KG)	39.0	43.7	41.3

On an average output per farm in Nuapada district was 546.2 kgs in kharif whereas, in rabi it was 1013.1 kgs. About 44 kgs were consumed by the household members and about 39 kgs were utilized for gift. Farmers in the district keep certain portion of their output as seed and had utilized about 33 kgs for seed purpose. About 25 kgs was used for wage labor payment. There is strong demand for seed in the district and about 180 kgs were sold as seed with an average price of Rs 63 per kg. On an average 449 kgs were sold as dry pod with an average rate of Rs 41.30/- per kg of groundnut.

4.12- Intermediaries involved in marketing of groundnut

Table 4.15 Intermediaries involved in marketing of groundnut

Intermediaries	**Frequency**
OSSC	22%
BUSINESSMAN	1%
TRADER	70%
VENDORS	1%
NOT SOLD	6.6%

There are many intermediaries involved in the forward linkage of groundnut supply chain in Nuapada. About 70 percent of the farmers sold their groundnut output to the traders. Traders are mainly sedentary middleman who procures the output from the farmers at the door step. OSSC procured seed from many farmers in Nuapada which was facilitated by ICRISAT. It contributed 22 percent of the total procurement. About 7 percent of the marketable surplus was not sold.

4.13- Marketing costs of groundnut

Table 4.16 Marketing costs of groundnut

Intermediaries	Packaging Cost	Transportation Cost	Marketing Fee	Commission Agent Fee	Labour Cost	Quantity purchased	Price per kg
OSSC	0	3.5	0	0	0	240	66
BUSINESS MAN	0	0	0	0	0	5	40
TRADER	20.31	7.5	0	0	0.78	462	40
VENDORS	0	0	0	0	0	2	25

In Nuapada, on an average. OSSC had procured 240 kgs of groundnut from the producers and the average price received by the farmers was Rs 66/- per kg. Very minimal cost was incurred in marketing the produce as majority of the groundnut sold by the farmers were at door step. Petty traders, small businessmen lift the procured quantity from the village itself. Only few respondents had spent money on any kind of marketing cost. Some intermediaries go to the village and procure groundnut and they also bear all related costs like packaging, labour and transportation cost. About 462 kgs of groundnut per farm was sold to traders at an average price of Rs 40 per kg. The villages where ICRISAT assisted in providing Devi variety of seeds, it facilitated to procure the seed through OSSC.

4.14- Application of FYM and fertilizer in groundnut

Table 4.17 Application of FYM and fertilizer in groundnut

Sl. No	FYM & fertilizers	Quantity
1	FYM(qt)	22.5
2	DAP(kg)	29.6
3	GROMOR(kg)	0.3
4	MOP(kg)	7.3
5	UREA(kg)	1.1
6	GYPSUM(kg)	5.7

Table no 4.17 reveals that on an average, about 22.5 kgs of FYM is used per acre by the farmers in the district in groundnut farming. On an average, fertilizers like DAP, Gromor, MOP, Urea and Gypsum were used at the rate of 29.6 kgs, 0.3 kg, 7.3 kgs, 1.1 kg and 5.7 kgs respectively per acre by the farmers in the district. It shows that there is a need of making the farmer understands about the use of fertilizers in proper doses. Low use of Gypsum was mainly because of non

availability. There were many farmers who did not apply any fertilizers due to fund crunch and awareness.

4.15- Average labour utilization in Nuapada

Table 4.18 Average labour utilization in groundnut farming in Nuapada during Kharif

In Nuapada, Kharif groundnut was found to be dominant. So cost and return is discussed for Kharif groundnut cultivation in the district. Bullock labour for land preparation varied from 7.5 bullock days in case of marginal farmers to 17.3 bullock days in case of large farmers. Use of tractor power was common in land preparation and it varied from around 2.6 hours in case of marginal farmers to 4.5 hours in case of large farmers. For sowing, bullock days requirement were 1.6 in case of marginal farmers to 3.3 days for large farmers. Human labour requirement also varied widely across size class of farmers for land preparation from 6 days in case of marginal farmer to 19 days for large farmers. Roughly about 1 hour was required for fertilizer application irrespective of size class of farmers. Weeds are major problem in case of kharif groundnut and as such major labour involvement is noticed for weeding. Here female laborers play vital role and it was found that high female labour of 8 days were employed for weeding in case of marginal farmers, whereas, it was 12 for small farmers and roughly 19 for large farmers. Male labour requirement for weeding was 4, 6 and 7 mandays respectively for marginal, small and large farmers. Plant protection measures were very limited and as such only around 2 hours were spent by the marginal farmers and that of small and large farmers it was 5 and 3.2 hours respectively.

Harvesting labour was almost equally shared by male and female. Total harvesting labour varied across size class from around 11 days in case of marginal farmers to 21 in case of large farmers. Threshing labour is mostly provided by the females. However, in case of marginal farmers of Nuapada district it was exception where about 13 male laborers were used against about 10 female labours. In case of small and large farmers female labour utilization for threshing was 15 and 20 days respectively.

Table 4.18- Average labour utilization in Nuapada during Kharif

	Marginal Farmers				Small Farmers				Large Farmers				
	Bullock (Days)	Female (Days)	Male (Days)	Tractor (Hour)	Bullock (Days)	Female (Days)	Male (Days)	Tractor (Hour)	Bullock (Days)	Female (Days)	Male (Days)	Male/ Female	Tractor (Hour)
Kharif													
Land preparation	7.5		5.9	2.6	11.6		12.1		17.3		18.9		4.5
FYM/Compost			2	1									0.3
Decortication		5.6				8.6				8.4	1		
Seed treatment			0.5								0		
Sowing	1.6	3.5	2.1		2.3	6.8	2.6		3.3	8.4	4.4		
Fertilizer application(Hours)		0.5	1.3				1.2				1.4		
Gypsum application			1				1.3				0.8		
Micronutrient application							1						
Plant protection(Hour)			2				5				3.2		
Weeding/Weedicide application		8.3	4			12	6			16.8	7		
Watching (Birds,Pigs..etc)			2.5				2.3				1		
Harvesting:Crop1		5.3	5.5			6.8	6.8			12.4	8.7		
Threshing groundnut		9.8	13			15	6	19		19.7		22	

Table 4.19 Average labour utilization in groundnut farming in Nuapada during Rabi

In Nuapada, rabi groundnut was found to be of least importance. However, cost and return is also discussed for rabi groundnut cultivation in the district. Bullock labour for land preparation varied from 6.7 bullock days in case of marginal farmers to 24.6 bullock days in case of large farmers. Use of tractor power was common in land preparation and it varied from around 3 hours in case of small farmers to 7 hours in case of large farmers. For sowing, bullock days requirement were 1.2 in case of marginal farmers to 5 days for large farmers. Human labour requirement also varied widely across size class of farmers for land preparation from 4 days in case of marginal farmer to 21 days for large farmers. Roughly about 1 hour was required for fertilizer application irrespective of size class of farmers. Weeds are major problem in case of rabi groundnut and as such major labour involvement is noticed for weeding. Here female laborers play vital role and it was found that high female labour of 6 days were employed for weeding in case of marginal farmers, whereas, it was 10 for small farmers and roughly 19 for large farmers. Male labour requirement for weeding was 2, 8 and 11 mandays respectively for marginal, small and large farmers. Plant protection measures were very limited and only large farmers employ 3 males in average for this purpose.

Harvesting labour was almost equally shared by male and female. Total harvesting labour varied across size class from around 8 days in case of marginal farmers to 26 in case of large farmers. Threshing labour is mostly provided by the females. However, in case of marginal farmers of Nuapada district it was 11 female laborers. In case of small farmers 21 female labors. In case of large farmers female labour utilization for threshing was 26 days.

Table 4.19- Average labour utilization in Nuapada GN Rabi

	Marginal Farmers				Small Farmers						Large Farmers				
	Bullock	Female	Male	Tractor	Bullock	Female	Male	Male/Female	Motor	Tractor	Bullock	Female	Male	Male/Female	Tractor
Rabi															
Land preparation	6.7		4.2		15		14.8			3	24.6		21.4		7
FYM/Compost			2	0									4		0
Decortication		5.9				10.6						11.5	15	50	
Seed treatment			0.5										0		
Sowing	1.2	2.7	1.6		3.1	7.8	4.2				5	12.9	6.6		
Fertilizer application			1.3				1.6						1.5		
Gypsum application			0.5				1						0.5		
Irrigation									8						
Plant protection													3		
Watching (Birds, Pigs..etc)							11					25	12		
Weeding/Weedicide application		6.2	2.3			9.6	7.8					18.9	11.3		
Harvesting:Crop1		4.7	3.8			7.9	8					17.9	8.8		
Threshing groundnut		11.2				20.6		28.5				26.4			

4.16- Per farm Input Output Economics

Table 4.20 Per Farm Input Output Economics of groundnut farming during Kharif

In kharif, the marginal farmers spend more in land preparation which was about 55 percent of the total cost. It is followed by threshing which was 20 percent of the total cost of cultivation. On an average, the farmers get an output of 6.5 quintals of groundnut and the average price received per quintal was Rs 3956.5/-. Average cost of production was estimated at Rs 7446/- and gross return of Rs 25692/- with a B:C ratio of 3.45 indicating that groundnut farming is a very remunerative proposition for marginal farmers.

In kharif, the small farmers spend more in land preparation which was 30 percent of the total cost. It was followed by sowing which was 21.2 percent of the total cost of cultivation. On an average, the farmers get an output of 3.8 quintals of groundnut which they could sell at an average of price of Rs 3182/- per quintal. Total cost for small farmers was estimated at Rs 3538/- with gross return of Rs 12106/- and B:C ratio of 3.4. So overall, groundnut farming also found to be too much profitable for small farmers of Nuapada district.

During kharif, the large farmers spend more in land preparation which was 35.6 percent of the total cost. It was followed by weeding operation whose cost was about 16 percent of the total cost of cultivation. On an average, the farmers get an output of 11.7 quintals of groundnut with an average selling price of Rs 5077/- per quintal. On an average large farmers spent about Rs 9810/- for groundnut farming with a gross return of Rs 59400/- and whopping B:C ratio of more than 6.

Table 4.20 Per Farm Input Output Economics in Kharif

	Marginal Farmers				Small Farmers			Large Farmers			
Row Labels	Bullock	Female	Male	Tractor	Bullock	Female	Male	Bullock	Female	Male	Tractor
Kharif											
Land preparation	1350 (18)		118.2 (2)	2625 (35)	750(21)		312(9)	1846(19)		900(9)	750(8)
FYM/Compost			400 (5)	250 (3)							500(5)
Decortication		41.3 (1)				90(2)			246(3)	0	
Seed treatment			0							0	
Sowing	305 (4)	124.2 (2)	103.1 (1)		157.9(4)	497.1(14)	95.4(3)	404.2(4)	565(6)	264.7(3)	
Fertilizer application		0	0				13.6(1)			0	
Gypsum application			0				0			0	
Micronutrient application							0				
Plant protection			0				0			0	
Watching (Birds, Pigs..etc)			0				233.3(7)			0	
Weeding/Weedicide application		328.3 (4)	0			638.8(18)	0		1283.3(13)	300(3)	
Harvesting:Crop1		0	341.7 (5)			126.3(4)	299.5(8)		800(8)	631.1(6)	
Threshing groundnut		209.1 (3)	1250 (17)			323.8(9)	0		1320(13)		
Average of pod yield(qt)	6.5				3.8			11.7			
Average of pod price (Rs/qt)	3956.5				3182			5077			
Total cost(Rs)	7445.7				3537.7			9810			
Total return(Rs)	25691.6				12106.2			59400			
B-C	3.45				3.4			6.1			
Kharif area	0.76				1.13			1.42			

Table 4.21 Per Farm Input Output Economics in groundnut farming during Rabi in Nuapada district

In rabi, the marginal farmers spend more in land preparation which was about 76 percent of the total cost. It is followed by sowing which was 24 percent of the total cost of cultivation. On an average, the farmers get an output of 3.5 quintals of groundnut and the average price received per quintal was Rs 4855.4/-. Average cost of production was estimated at Rs 1575.9/- and gross return of Rs 17028/- with a B:C ratio of 10.8 indicating that groundnut farming is a very remunerative proposition for marginal farmers.

In rabi, the small farmers spend more in land preparation which was 49 percent of the total cost. It was followed by sowing which was 18 percent of the total cost of cultivation. On an average, the farmers get an output of 8.5 quintals of groundnut which they could sell at an average of price of Rs 3346/- per quintal. Total cost for small farmers was estimated at Rs 6335/- with gross return of Rs 28448/- and B:C ratio of 4.5. So overall, groundnut farming also found to be too much profitable for small farmers of Nuapada district.

During rabi, the large farmers spend more in decortication which was 30 percent of the total cost. It was followed by watching operation whose cost was about 16 percent of the total cost of cultivation. On an average, the farmers get an output of 14.5 quintals of groundnut with an average selling price of Rs 4571/- per quintal. On an average large farmers spent about Rs 20881/- for groundnut farming with a gross return of Rs 66204/- and whopping B:C ratio of more than 3.2.

So it can be seen from both the tables that groundnut proves to be a cash crop for the farmers of the district and as such area under groundnut is increasing the district over the years.

Table 4.21 (Per Farm Input Output Economics in Rabi)

	Marginal Farmers			Small Farmers					Large Farmers			
Row Labels	Bullock	Female	Male	Bullock	Female	Male	Motor	Tractor	Bullock	Female	Male	Male/Female
Rabi												
Land preparation	1193.2(75)		0	292.3 (5)		409.2 (6)		2400 (38)	923.1 (4)		1514.3 (7)	
FYM/Compost			0								0	
Decortication		0			287.9 (4)					245 (1)	0	6000 (29)
Seed treatment			0								0	
Sowing	224.6(14)	118(7)	40(3)	100 (2)	666.3 (10)	365.3 (6)			42.9 (1)	1211.4 (3)	569 (6)	
Fertilizer application			0			0					0	
Gypsum application			0			0					0	
Irrigation							800 (13)					
Watching (Birds,Pigs..etc)						0				3000 (14)	375 (2)	
Weeding/Weedicide application		0	0		412.2 (6)	225 (4)				1780 (8)	750 (4)	
Harvesting:Crop1		0	0		78.5 (1)	218.5 (3)				1743 (8)	941.7(4)	
Threshing groundnut		0			80 (2)					1785.7 ()		
Average of I_O_Quantity	3.5			8.5					14.5			
Average of I_O_Price	4855.4			3346.9					4571.4			
Total cost	1575.9			6335.1					20881			
Total return	17028.4			28448.5					66204.1			
B-C	10.8			4.5					3.2			
Rabi area	0.6			1.37					2.12			

Value Chain of Groundnut in Nuapada:

Input dealers in Nuapada

In Nuapada, input dealers are not dealing with seeds. Mainly supply of improved seeds is prerogative of agriculture department and other organizations are working actively to provide improved groundnut varieties to the farmers and as such active input dealers felt that groundnut seed business was not profitable for. Seeds are mainly used from own harvested crop. During planting season, local sedentary traders play vital role in providing groundnut seeds to the needy farmers.

Input dealers are mainly active in fertilizer and pesticide business and provide to certain extension services to the farmers. They help farmers in getting the extra needed fertilizers, pesticides even in some cases they advise the farmers in many ways. Input dealers are playing an important role in giving consultation to the farmers.

In Khariar, the input dealers are playing important role in providing advice to the farmers regarding line sowing, white fly control mechanism etc. Some times in association with some NGOs they are also providing quality improved varieties of seeds to the farmers. But due to push selling of the inorganic chemicals by some private parties, enough margin is not obtained in agri-input business. So government should take appropriate measures in dealing with the situation.

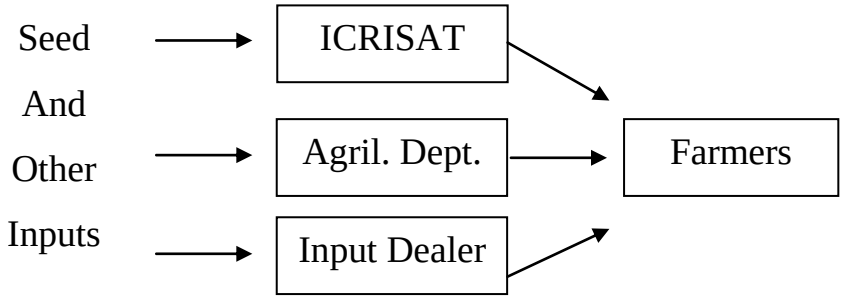
In Nuapada, due to high frequency of drought occurrence, the business of input dealers is also at risk. Input dealers can play a role of crusaders in developing the farm practices and thereby help in lifting the economic condition of the farmers.

Retailers

In Nuapada there are very few retailers. No organized value chain of groundnut exists in the district. It is completely a need based market. Small sedentary traders who enter into procurement of groundnut from the farmer do small transaction to reap immediate profit. The amount of groundnut sold at a time is very less as compare to the amount of production. The small traders are taking groundnut in units of “kilogram” or “Maana”.

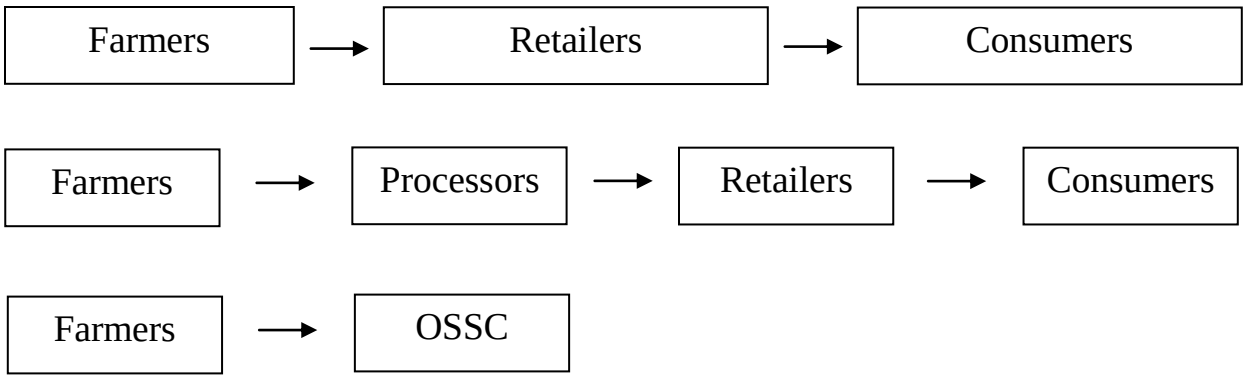
There are many farmers who also act as traders. They take groundnut from the farmers only to sell them back at a much higher price. Generally in Komna it is found that such people take groundnut at a price of Rs 30/- per kg and sell them back at the rate of Rs 50 to 60/- per kg. The government apathy in timely supply of seeds is the main reason for creating these middlemen.

Backward Linkage of Value Chains seen in Nuapada



In Nuapada, farmers at times receive seed from ICRISAT, agriculture department and other sources of seeds like other farmers, Mahajans etc.

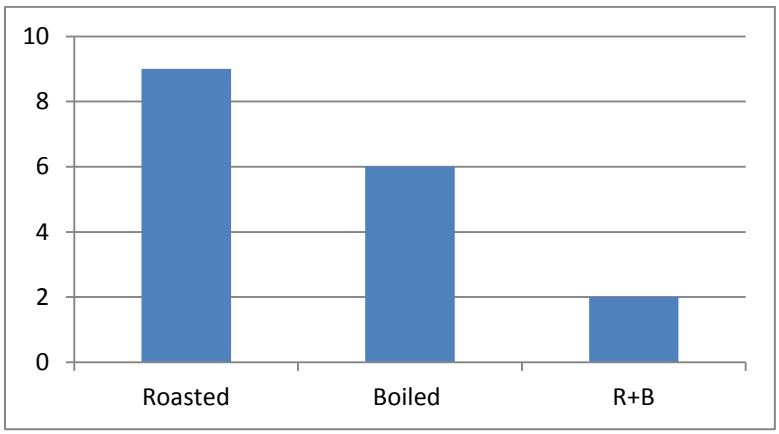
Forward Linkage of Value Chains seen in Nuapada



In Nuapada, there is no organized value chain. Basically these three kinds of forward linkages are seen. Some small sedentary traders act as middleman for the procurement of the groundnut in small amounts on a daily or weekly basis and sell the product in the daily market. There are few processors also who play an important role in processing the groundnut and selling them to the retailers to sell the products with higher price and higher margin. Also ICRISAT facilitates to procure the groundnut seed for OSSC. Farmers get a fair price out of their output by this linkage.

Consumer Preference

In Nuapada, consumers of ground are fond of either boiled or roasted groundnut (primary processing). No other groundnut processed product has any noticeable demand in the district. The graph reveals that the consumers' preference for groundnut processed product. The preference also changes from season to season and especially in the festival seasons like "Makar Sankranti" people prefer sweet confectionary called "Laddu" out of groundnut.



Consumers preference for groundnut processed products

CHAPTER-5

SUMMARY & CONCLUSION:

- Area under groundnut cultivation is decreasing over the years because of fluctuating prices and loss of crop due to many agro-biological and climatic factors. So special focus should be given to groundnut farmers in assuring minimum support price and procuring the groundnut from the mandis or through societies.

- There is no proper place of storage of groundnut. So there is a need of proper infrastructure for that.

- As there are many farmers who are illiterate which is common in tribal dominated district of Nuapada, proper scope for training should be there. The farmers should be made aware about the new technologies for higher yield.

- In many areas now also there is no proper channel or player from whom farmers can get groundnut seeds. In Nuapada, generally the department of agriculture provides seed to the farmers in a large scale but timely availability is a serious issue. So there is a need of a system of seed bank where the farmers can deposit their surplus seed and can get the seed whenever they need.

- In Nuapada, generally on the basis of land holding the farmers get improved variety of seeds. But the problem in this system is there are many farmers who are tenant farmers. There is no facility for tenant farmers to get improved varieties of seeds. So all the organizations who are facilitating provisioning of improved varieties to the farmers should come up with a system of paper work which can legalize this tenancy system and provide all those facilities to the farmers with less land also.

- Size of groundnut plot is proportionate to the adoption of improved technologies. And as there are many marginal and small farmers who need proper consultation for sound farm practices. Many farmers have issues regarding farming but they are not finding proper extension service so there should have some trust worthy consultation facility which can solve problems of the farmers by providing an economic solution.

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Survey on Adoption of Improved Groundnut Technologies in Odisha

Sample No.

Name of the investigator: _____Mobile:_____

1. Socio-economic background of the sample farmer/household

Name _____ Son/ Daughter of _____ Wife/ Husband of_____

Address: Village: _____ Block _____District _____, Mobile No:_____ Land mark _____Aadhar No. _____

Lat-Long (GPS) coordinates of household location _____N, _____ E

Age_____ Caste _____ Years of education _____

Main Occupation_____ Secondary occupation _____

Any other occupation _____

Household size: Adult male_____, Adult female _____ Boy_____, Girl_____

How many are in farm operation? Adult Male____, Adult Female____ Boy_____, Girl_____

How many earning members? Male_____, Female_____

Average annual net income (Rs): Crops_____, Livestock_____, Off-farm labour_____, Non-farm labour_____, Business_____, Service_____, Remittances_____, Others (specify)_____

2. Land portfolio of the sample household and area allocation to Groundnut:

Particular	Kharif		Rabi/Summer	
	Irrigated	Rainfed	Irrigated	Rainfed
Owned land (Acre/Decimal)				
Leased in (Acre/Decimal)				
Leased out (Acre/Decimal)				
Total operated land (Acre/Decimal)				
Area feasible for groundnut (Acre/Decimal)				
Area allocation under owned land (Acre/Decimal)				
Area allocation under leased in land (Acre/Decimal)				
If leased in, kindly mention the terms of tenancy				
Share (percentage)				
Fixed rent (Rs)				
Year of adoption of groundnut cultivation				
Area allocation in the inception year (Acre/Decimal)				
Are you willing to increase area under groundnut? Y/N If yes, kindly mention likely increase in area-(Ac/Dc)				

Whether aware about Direct Benefit Transfer (DBT) in agriculture realizing subsidy? If yes whether you have availed it? Kindly mention in detail. What crop seeds/machinery etc?_____

Whether availed the same for groundnut seed purchase from government sources? Yes/No

If yes, when(Year)_____Season_____ Quantity purchased(kg)_____ Cost(Rs)_____Subsidy availed(Rs)_____

Problems in implementation of DBT_____

Specific groundnut varieties grown during last year (2016-17) (For example, AK 12-24, TMV 2, TAG 24, Devi, Kadri 6, Kadri 3, ICGS 76, TG 3, TG 38, TG 51, TG 58, JAL 42, Smruti, etc.)

Sl. No.	Season (Kharif=1, Rabi=2, Summer=3	Variety Name (list all varieties grown)	Amount of land (Acre/ Decimal)	Tenancy[1]	Soil Type[2]	Irrigated/ Rainfed	Production (qt)	Source of seed[3]	Distance to the source	Cost of transportation	Quantity purchased	Price per kg
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1.												
2.												
3.												
4.												
5.												
6.												

1.Tenancy: Own land (OW), leased-in (LI), leased-out (LO), shared-in (SI), and shared-out (SO)

2. Soil type: Clay=1, Clay loam=2, Sandy clay loam=3, Loam=4, Sandy loam=5, Loamy sand=6, Sandy=7, Gravelly=8

3. Source of seed: Own harvest=1; Purchased/exchanged from fellow farmers=2; Purchased from seed traders=3; Government=4; Friends/relative=5, NGO=6, University=7, ICRISAT=8, Others, specify the sources=9

3. The most important variety grown during kharif season

Name of the variety (from information in Table 3) _____

a) When did you start cultivating this variety for the first time? Year_____

b) From whom did you first hear the name of this variety? (Mark one)

(1) Listening Radio, (2) Watching T.V. (3) Farmers of the village (4) Farmers of other village

(4) Fertilizer/pesticide dealers (5) Friends and relatives (6) Local officers of Agricultural department (7) KVK/University officials (8) Seed dealers (9) OSSC Ltd. (10) ICRISAT

(11) Other sources (Specify)

c) Land sown with this variety in the first year? Acre _____Decimal _____

d) From where did you get the seed? Own harvest, Purchased/exchanged from fellow farmers, purchased from seed traders, Government, Friends/relatives, NGO, University, ICRISAT, Others(specify)

e) Land sown with this variety in the second year? Acre _____Decimal _____

4. What are the traits for which you like this variety (up to three)?

(1) High yield (2) Less weed growth (3) Less insect attack (4) Less attack by diseases

(5) Drought resistant (6) Short duration (7) Tasty for eating (8) Attractive kernel colour

(9) Bolder grain (10) High market demand (11) High oil content (12) Good demand for confectionary (13) Easy availability of seeds (14) Highly adaptable to the local condition

(15) Determinate (16) Indeterminate (17) Others (specify) _____

5. The most important variety you grow during the rabi/summer season.

Name of the variety (from Table 3) _____

a) When did you start cultivating this variety for the first time ? Year____

b) From whom did you first hear the name of this variety? (Mark one) ☐

c) Listening Radio, (2) Watching T.V. (3) Farmers of the village (4) Farmers of other village

(4) Fertilizer/pesticide dealers (5) Friends and relatives (6) Local officers of Agricultural department (7) KVK/University officials (8) Seed dealers (9) OSSC Ltd. (10) ICRISAT

(11) Other sources (Specify)

d) Land sown with this variety in the first year? Acre _____Decimal _____

f) From where did you get the seed? Own harvest, Purchased/exchanged from fellow farmers, purchased from seed traders, Government, Friends/relatives, NGO, University, ICRISAT, Others(specify)

e) Land sown with this variety in the second year? Decimal _____

6. What are the traits for which you like this variety (up to three)?

(1)High yield (2) Less weed growth (3) Less insect attack (4) Less attack by diseases (5) Drought resistant (6) Short duration (7) Tasty for eating (8) Attractive kernel colour (9) Bolder grain (10) High market demand (11) High oil content (12) Good demand for confectionary (13) Easy availability of seeds (14) Highly adaptable to the local condition (15) Determinate (16) Indeterminate (17) Others (specify) _____

7. Allocation of area under different cultivars/ varieties in the last five years

Cultivars/ varieties	Area sown (acres/decimals)								
	Area in 2013-14		Area in 2014-15		Area in 2015-16		Area in 2016-17		Area, 2017
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	Kharif
1.									
2.									
3.									
4.									
5.									
6.									

8. Are there improved varieties that you adopted but stopped growing recently? Yes/No

If yes, name of the varieties? _____

Reasons for which you stopped growing those varieties (up to three)?

(1)Low yield (2) Susceptible to pests/diseases (3) Susceptible to drought (4) Longer duration (5) Seed not available (6) Low market demand (7) Others (specify) _____

9. Major constraints in purchasing new seed

(1)Lack of awareness about recommended variety (2) Non-availability of required variety (3) Seed is not of good quality (4) High seed price (5) Need to travel long distances to purchase seed (6) Credit facility not available (7) Poor germination (8) Others (specify)_____

10. Yield and income advantage because of adoption of new ICRISAT/improved varieties

Sl. No.	Displaced variety				Replaced variety			
	Variety	Area (Ac/Dc)	Av. Yield (qt/ac)	Av. Price (Rs/qt)	Variety	Area (Ac/Dc)	Av. Yield (qt/ac)	Av. Price (Rs/qt)
1.								
2.								
3.								

11. Extra income generated due to adoption of improved seeds and their pattern of expenditure / investment

Year	Additional income generated (Rs)	Expenditure/ Investment of additional income generated in Rs								
		Meeting farm expenses	Education	Food	Health	Creating productive assets	Purchasing white goods	Social functions	Savings	Others
2013-14										
2014-15										
2015-16										
2016-17										

Whether it leads to increased thrift? Yes/No If yes, how much savings have been made till now?

12. What are the constraints in increasing area allocation to groundnut (Mark ✓)?

(1)Lack of timely availability of quality seeds (2) Labour problem (3) Low market price (4) Marketing problem (5) Early cessation of monsoon which makes low moisture retention not suitable for GN planting during rabi season (6) Low yield due to lack of rainfall during pegging and at grain filling stage (7) Climate change (8) Lack of Institutional credit (9) Lack of support from extension agencies (10) High disease attack (11) High weed infestation

13. Extent of mechanization followed in Groundnut farming (Mark ✓).

(1)Groundnut decortications (2) Tillage of land (3) Sowing through seed drill (4) Fertilizer application (5) Weeding and intercultural practice (6) Irrigation (7) Application of plant protection chemicals (8) Harvesting (9) Threshing (10) Post harvest management

14. Technology adoption in Groundnut.

a) Do you have soil health card? Y/N _____. If Yes, take a photograph of it.
b) Whether soil testing suggestions are followed?_____
c) Whether soil amendment with liming is made? If yes quantity applied per acre___(qt)
d) Whether seed treatment is followed? If yes, kindly mention the bio/chemical agent____(Rhizobium culture/Thiram/Captan/Bavistin/Chlorpyriphos/Others)
e) Whether sowing by seed cum fertilizer drill? If yes, kindly mention since how long followed and area planted. Year _____, Area planted last year Acre/Decimal_____
f) Recommended spacing followed? **Yes/No**. If no, spacing followed: ____ X____(cm).
g) Whether weedicide is applied? Yes/No If yes, since how long followed: _____ (Years) area treated_____ chemical name _____(Pendimethalin/others). Pre emergence or post emergence?_____ , Area treated last year (Acre/ Decimal) ___
h) Are you applying Gypsum during pegging stage? **Yes/No** If yes, quantity applied: _____ qt/ac.
i) Whether you follow Integrated Nutrient Management in Groundnut? **Yes/No** If yes, quantity of FYM applied _____ qt/ac., DAP application_____ kg/ac., Potash application_____ kg/ac., Gromor(20:20:0:13)application_____ kg/ac. Gromor(14:35:14)application_____ kg/ac., Gromor(10:26:26)application_____ kg/ac. Gromor(12:33:16)application_____ kg/ac., Gromor(28:28:0)application_____ kg/ac. Others (Specify)_____kg/ac
j) **Whether any micronutrient is applied? Yes/No If yes,** Zinc Sulphate _____ kg/ac., Iron Sulphate _____ kg/ac, Borax _____ kg/ac Others (Specify)_____kg/ac
k) Whether you follow Integrated Pest Management in Groundnut? **Yes/No** If yes kindly mention in detail_____
l) Whether intercropping is followed in groundnut? **Yes/No** If yes kindly mention the crops and row arrangement. Groundnut ____Pigeon pea_____, Groundnut ____, Black gram_____, Groundnut _____ Sesamum_____, Groundnut ____Cowpea____, Groundnut____Mustard__ Groundnut_____ Other crops(specify)____
m) Kindly mention any other technology you are following in groundnut farming: _____

15. Utilization of crop production

Utilization of ***groundnut output 2016-17 season***

Cultivars/ varieties	Grain output (kgs)	Consumed (kgs)	Other uses* (kgs)	Wage payment	Own seed (kgs)	Sold as seed (kgs)	Seed sale price Rs/kg	Sold as grain (kgs)	Grain price (Rs / Kg)	By product (kgs)	Own Use (kgs)	Sold (kgs)	Sale price Rs/kg

* Includes gifts and fed to cattle etc.

16. Marketing of <u>groundnut output during 2016-17 season</u>:

a) Where/ to whom sold_____ Quantity sold _____ qt.
b) Whether green pod or dry pod?_____. If green pod, quantity sold_____ qt. Price received _____ If dry pod, quantity sold_____ qt. Price received _____
c) Distance to regulated market _____ (kms); Distance to storage facility _____ (kms)
d) Total sale during the year: Kharif _____Kgs, Av. price received Rs _____/qt Rabi/Summer _____Kgs, Average price received Rs _____/qt

17. Marketing cost of groundnut

Name of market	Place	Distance (Kms)	To whom sold	Marketing cost **(for 30/40 kg per bag) Rs.**					Qty sold (kgs)	Price (Rs/kg)
				Packing / Bagging	Trans-port	Commi-ssion agent	Market fee	Labor		
Village										
Weekly										
Regulated										
Terminal										
Other										

18. Did you sell entire crop output immediately after harvest? Yes ☐ /No ☐

If **YES**, reasons (Rank top three)	Rank	If **NO**, reasons (Rank top three)	Rank
1. Lack of money in hand		1. Expecting higher price	
2. Repayment of loan amount		2.No urgent requirement of money	
3. For household needs		3.To meet the household needs	
4. To invest in business		4.Others (specify) _____	
5. No storage facility			
6. Others (specify) _____			

19. What kind of incentives/subsidies received from Government/other agencies, while cultivating this crop?

Incentive	Description and extent of benefits
1. Seeds	
2. Fertilizers	
3. Pesticides	
4. Credit	
5. Output price	
6. Information	
7. Others	

20. Sources of credit(multiple): Commercial banks, Amount_____ Rate of interest____
Private banks, Amount_____ Rate of interest____
Cooperatives, Amount_____ Rate of interest
Friends, Amount_____ Rate of interest_____
Relatives, Amount_____ Rate of interest_____
Input dealers, Amount_____ Rate of interest_____
Village money lender, Amount_____ Rate of interest_____
SHG, Amount_____ Rate of interest_____
Micro Finance Institution (MFI), Amount_____ Rate of interest_____
Others(Please specify), Amount_____ Rate of interest_____ Terms of repayment: Commercial banks _____, Private banks _____, Cooperatives_____

21. Input-output module: *(should be collected for the **main cultivar** of Groundnut in Kharif and Rabi seasons)*

Groundnut details	**Kharif**	**Rabi/Summer**
	Plot name:	Plot name:
i. Plot size (ac.)		
ii. Cropped area (ac.)		
iii. Variety name		
iv. Sole/inter-crop		
v. Season (K/R/S)		
vi. Irrigated/dry		

Input-output details

Operations	Costs (**Rs per plot area only**)							Costs (**Rs per plot area only**)						
	Input		Labour					Input		Labour				
	qty	cost	qty				cost	Qty	cost	Qty				cost
			AM[1]	AF[2]	CM[3]	CF[4]				AM[1]	AF[2]	CM[3]	CF[4]	
i. Land preparation (1) Bullock														
i. Land preparation (2) Machine														
ii. FYM/Compost + carrying cost														
iii. Seed (whole pod)(in kg)														
iv. Pod decortication														
v. Sowing (1) Labour (MD)														
v. Sowing (2) Bullock (BD)/ machinery (Hrs)														
vi. Fertilizer (Kg)														
vii. Micro-nutrient (Kg)														
viii. Inter-culture (Manday)														
ix. Weeding (Labour- Manday)														
x.Plant protection chemicals (kg/ml)														
x. Irrigation (hours and labour)														
xi. Watching expenses(labour)														
xii. Harvesting (labour- Manday)														
xiii. Threshing costs including drying(labour- Manday)														
xiv. Marketing costs (all costs including bagging, storing, transporting)														
xv. Rental value per season														
xvi. Others costs (if any)														
xvii. Grain yield (kgs)														
xviii. Grain price (Rs/kg)														
xix. Fodder yield (kgs)														
xx. Fodder price (Rs/kg)														
xxi. Other income (if any)														

Note: ***All the costs applicable to exact cropped area of plot only***

In seed costs: *include seed treatment costs also if any, kindly include decortications and transportation cost*

In Fertilizer costs and plant protection costs: *include the application labor costs also if any*

In Irrigation costs: *include the price paid for buying water from outside*

Rental value: *Only write the per season value only (not for year)*

Note: [1] Adult male, [2] Adult female, [3] Child male, [4] Child female

List of Farmers

Gn_Tech_Id	Respondent_Name	Village	Block
442	Netramani Bhoi	Chhata	Khariar
443	Thakur Majhi	Chhata	Khariar
444	Niranjan Bhoi	Bhojpur	Khariar
445	Nilamani Bhoi	Bhojpur	Khariar
446	Aditya Bhoi	Bhojpur	Khariar
447	Purnachandra Dal	Dargaon	Boden
448	Budharam Dal	Dargaon	Boden
449	Ramlal Sabar	Palsipani	Komna
450	Giridhar Sabar	Palsipani	Komna
451	Adhikari Sahoo	Palsipani	Komna
452	Dhanisingh Rout	Dharamsagar	Komna
453	Champeswar Rout	Dharamsagar	Komna
454	Bhagatram Bakul	Kulingamal	Boden
455	Ganapati Naik	Kulingamal	Boden
456	Tapan Sha	Kapsi	Sinapali
457	Akhila Singh Majhi	Hatibandha	Sinapali
458	Balia Singh Majhi	Hatibandha	Sinapali
128	Lalit Mohan Nag	Chhata	Khariar
129	Krushna Kumar Pande	Chhata	Khariar
130	Tularam Majhi	Chhata	Khariar
131	Birendra Bhoi	Bhojpur	Khariar
132	Rajendra Kata	Bhojpur	Khariar
133	Hurda Dal	Dargaon	Boden
134	Tikiram Dal	Dargaon	Boden
135	Gobind Dal	Dargaon	Boden
136	Makrand Sabar	Palsipani	Komna
137	Madan Sabar	Palsipani	Komna
138	Makar Rout	Dharamsagar	Komna
139	Mahadev Rout	Dharamsagar	Komna
140	Damburu Rout	Dharamsagar	Komna
141	Garna Rout	Kulingamal	Boden
142	Ramesh Majhi	Kulingamal	Boden
143	Dagareswar Majhi	Kulingamal	Boden
144	Nalsingh Majhi	Kulingamal	Boden
145	Sailendri Rana	Kapsi	Sinapali

146	Premlal Rana	Kapsi	Sinapali
147	Jaktanan Saha	Kapsi	Sinapali
148	Gouraharis Saha	Kapsi	Sinapali
149	Achutananda Majhi	Hatibandha	Sinapali
150	Santosh Bhoi	Hatibandha	Sinapali
151	Bharat Majhi	Hatibandha	Sinapali
152	Puspanjali Bhoi	Hatibandha	Sinapali
531	Chintamani Bhoi	Chhata	Khariar
532	Meghanath Bhoi	Chhata	Khariar
533	Khageswar Bhoi	Bhojpur	Khariar
534	Satyaban Thapa	Bhojpur	Khariar
535	Subhash Bhoi	Bhojpur	Khariar
536	Dhani Singh Dal	Dargaon	Boden
537	Ban Bihari Kodamunda	Dargaon	Boden
538	Birendra Dinia	Palsipani	Komna
539	Chabila Sabar	Palsipani	Komna
540	Santosh Sabar	Palsipani	Komna
541	Dharam Rout	Dharamsagar	Komna
542	Daru Rout	Dharamsagar	Komna
543	Gajendra Nayak	Kulingamal	Boden
544	Naresh Majhi	Kulingamal	Boden
545	Gagan Sha	Kapsi	Sinapali
546	Basudev Sha	Kapsi	Sinapali
547	Padmanav Sha	Kapsi	Sinapali
548	Pancha Bhoi	Hatibandha	Sinapali
549	Bidyadhar Bhoi	Hatibandha	Sinapali
550	Makara Bhoi	Hatibandha	Sinapali
342	Sankar Lal Bhoi	Chhata	Khariar
344	Debanand Hans	Bhojpur	Khariar
345	Jhasketan Bhoi	Bhojpur	Khariar
346	Lalit Dal	Dargaon	Boden
347	Dolamani Dal	Dargaon	Boden
348	Asaram Dal	Dargaon	Boden
349	Satya Sabar	Palsipani	Komna
350	Pabitra Panda	Palsipani	Komna
351	Raj Kumar Rout	Dharamsagar	Komna
352	Chaturbhuja Rout	Dharamsagar	Komna

353	Lalit Majhi	Kulingamal	Boden
354	Sankirtan Majhi	Kulingamal	Boden
355	Gokul Nayak	Kulingamal	Boden
356	Parmanand Sha	Kapsi	Sinapali
357	Khirasindhu Sha	Kapsi	Sinapali
358	Ramanchal Majhi	Hatibandha	Sinapali
343	Phaganu Bhoi	Chhata	Khariar
1	Dhanurjay Sunani	Komna	Komna
2	Lalit Kumar Dura	Komna	Komna
3	Kalidash Chhatra	Komna	Komna
4	Jukta Naik	Palsada	Boden
5	Ghanashyam Naik	Palsada	Boden
6	Tiknu Malik	Palsada	Boden
7	Upendra Majhi	Jogenpadar	Sinapali
8	Sanatan Majhi	Jogenpadar	Sinapali
9	Motilal Naik	Jogenpadar	Sinapali
10	Rugdhar Rana	Mandosil	Khariar
11	Parameswar Rana	Mandosil	Khariar
12	Purushottam Rana	Mandosil	Khariar