Diagnostic Study of Maize Cluster in Nabarangpur District, Odisha

Submitted to: The DC (MSME), Ministry of MSME (Government of India)

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Acknowledgement

We are very thankful to the DC, MSME for sanctioning the present diagnostic study. We sincerely thank all entrepreneurs of the cluster who made this study possible by participating in surveys and the stakeholder consultation workshop. We thank the, General Manager, DIC and Assistant General Manager, DIC, District Agriculture Officer, AGM, NABARD for their kind cooperation and support during the cluster workshop.

We appreciate the hard work of our field coordinators who braved all odds to complete this study in time. We thank all workshop participants without whose cooperation; the study could not have seen its fructification.

Cluster Team, CSREM

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Executive summary

India is the 7th largest producer of maize with a production of 13.85 million MT from an area of 7.7 million ha. The average yield in India is 1783 Kg/ha which is very low as against USA (78924Kg/ha), Canada (7819) and the world average of 4472 kg/ha. The traditional maize producing states like Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh together constitute nearly 45% of the total area under maize. In India, maize is used for human consumption (35%), poultry feed (25%), cattle feed (25%) and industrial uses (15%). Direct human consumption of maize has declined over time, while feed and industrial uses have increased. Rising household incomes have shifted consumption of maize to other cereals like rice and wheat. They have also led to an increased consumption of meat, particularly of poultry, which has increased the demand for maize as feed. Increased industrial demand for maize comes primarily from the starch industry.

Orissa accounts for nearly 2.4% of the area under the crop and 2.1% of total maize production in the country. Maize is the second largest cereal crop [after rice] in the state in terms of area under cultivation and production. Maize is cultivated in nearly 2 lakh hectares with a total production of 3.19 lakh MT. Most of the cultivation happens in Kharif season. The productivity of the crop is 1602 kg/ha which is comparable with the national average of 1783 kg/ha. Maize accounts for nearly 4.29% of total cereal production and 3.89 % of the total food grain production in the state.

The SWOT analysis of the maize processing cluster in Nabarangpur revealed that the cluster has the strengths in terms of availability of raw materials, willingness of farmers for cultivation, government schemes and programs for maize production and processing, increasing demand for maize from cattle feed and poultry industry etc. The major weaknesses of the cluster include seasonality of production, inadequate processing facilities, inadequate infrastructure facilities for storage and lack of marketing support. Maize processing cluster offers opportunities for setting up of large scale processing units for processing of value added products.

Introduction

Maize is the third most important food grain crop in India and is cultivated about 7.7 million hectares**.** Maize is cultivated in diverse geographical condition ranging from semi-arid to sub-humid and humid regions. The traditional maize growing states in India include Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. Maize is largely grown as subsistence crops to meet food needs as well as to meet the feed requirements of poultry and cattle feed. Maize is characterized as Queen of all Cereals considering the importance of the crop.

Maize (*Zea mays*) is classified into dent flint waxy sweet and pop corn categories. Dent corn (*Zea mays* var. indentata) also known as field corn containing both hard and soft starch becomes indented at maturity. Flint corn (*Zea mays* var. indurata) having hard horny rounded or short and flat kernels; with the soft and starchy endosperm is enclosed by hard outer layer. Both of these varieties are used for industrial purposes. Popcorn (*Zea mays* var. everta) has small pointed and rounded kernels with very hard endosperm which on exposure to dry heat popped by the expulsion of the contained moisture and forming a white starchy mass many times the size of the original kernel. Sweet corn (*Zea saccharata* or *Zea rugosa*) is distinguished by kernels containing a high percentage of sugar in the milk stage and therefore suitable for table use. Indian maize has white, red, purple, brown or multicoloured kernels and is characteristically dent corn. The dent corn is useful for starch processing by wet milling method.

Global maize production

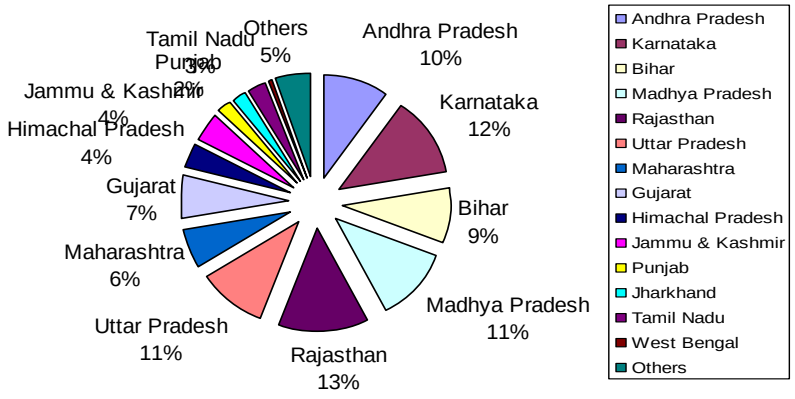
The total area under maize cultivation in the world is 139 million hectares with a production of 598 million MT (mMT). USA is the world's largest producer and exporter of maize with an out put of 240 mMT from an area of 29 million hectares. Other major producers are China (125 mMT), European Union (39 mMT), Brazil (37 mMT), Mexico (19 mMT), Argentina (14 mMT) and India (13.85 mMT). Among all cereals, maize occupies the fifth largest in area, fourth largest in output and third largest in yield.

Maize production in India

India is the 7th largest producer with a production of 13.85 mMT. The average yield in India is 1783 Kg/ha which is very low as against USA (78924Kg/ha), Canada (7819) and the world average of 4472kg/ha.

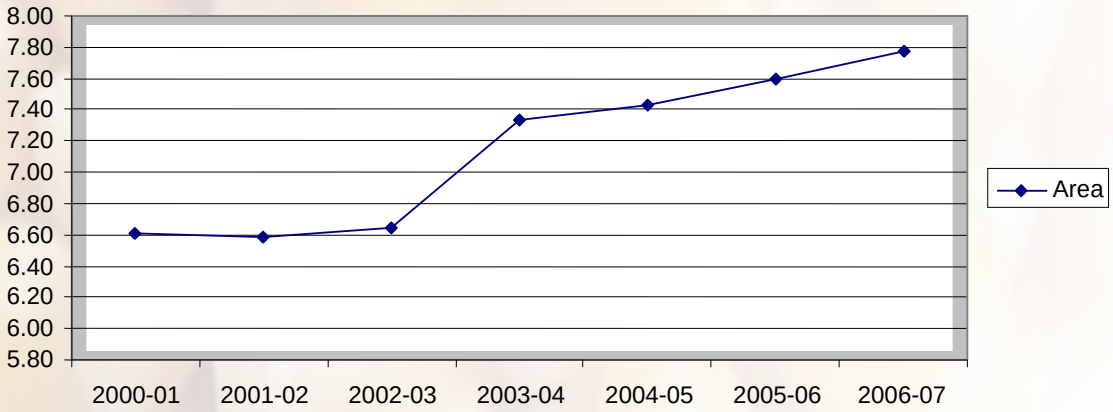
In India the total area under cultivation of maize consists of 7.7 million ha during 2006-07. The traditional maize producing states like Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh together constitute nearly 45% of the total area under maize.

Figure 1: Major maize producing states in India



The non-traditional maize producing states like Karnataka and Andhra Pradesh accounts for 22% of area under cultivation. (In these places maize is mainly used for feed requirement of poultry and cattle). The last few years witnessed continuous increase in area under cultivation of this crop.

Figure 2: Trends in area under cultivation

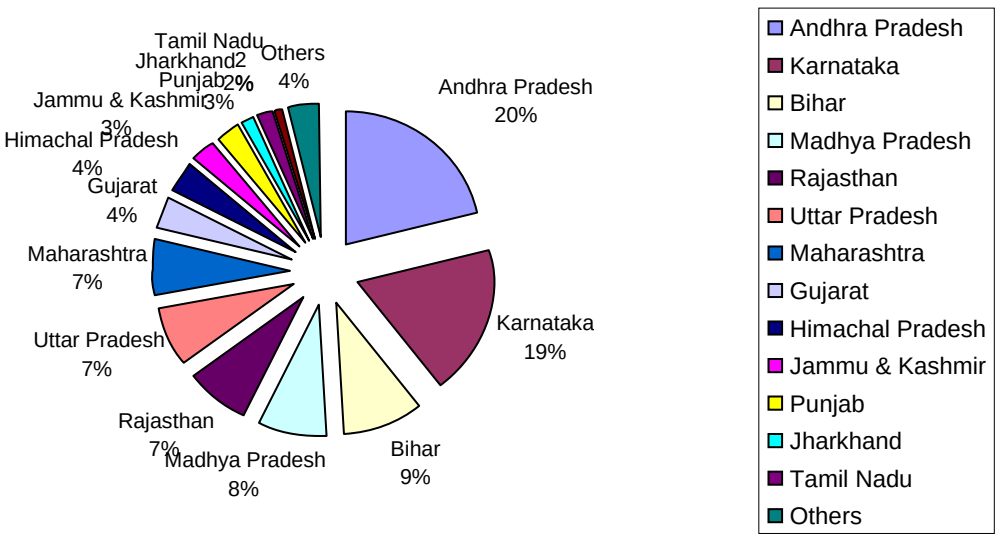


The total maize production in India consists of 13.85 million tones. Andhra Pradesh is the largest producer (20%) followed by Karnataka (19%). The southern states like Andhra Pradesh and Karnataka together accounts for nearly 39% of total production. In these states the product is mainly used for feeding poultry and cattle. Andhra Pradesh, Karnataka Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh together contribute nearly 70% of the maize production in the country. The following figure provides the share various states in maize production in India.

Table 1: Maize production in India

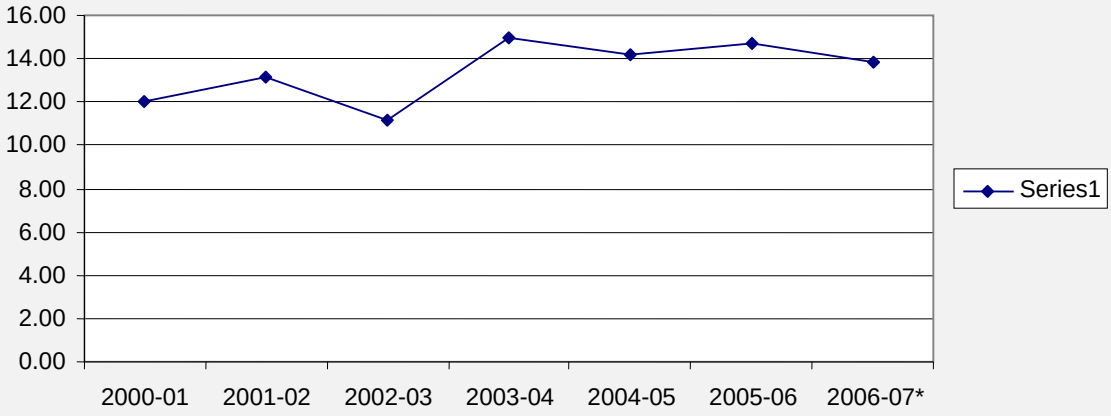
Year	Area in million Hectares	Production in million tones	Yield in Kg/ha	% Coverage Under Irrigation
1	**2**	**3**	**4**	**5**
2000-01	6.61	12.04	1822	22.4
2001-02	6.58	13.16	2000	20.5
2002-03	6.64	11.15	1681	19.5
2003-04	7.34	14.98	2041	19.1
2004-05	7.43	14.17	1907	NA
2005-06	7.59	14.71	1938	NA
2006-07	7.77	13.85	1783	NA

Figure 3: Maize production in India



During the last few years the production trend is almost stagnant. The provisional estimate for the year 2006-07 shows further decline in total maize output in the country.

Figure 4: Trends in production of Maize

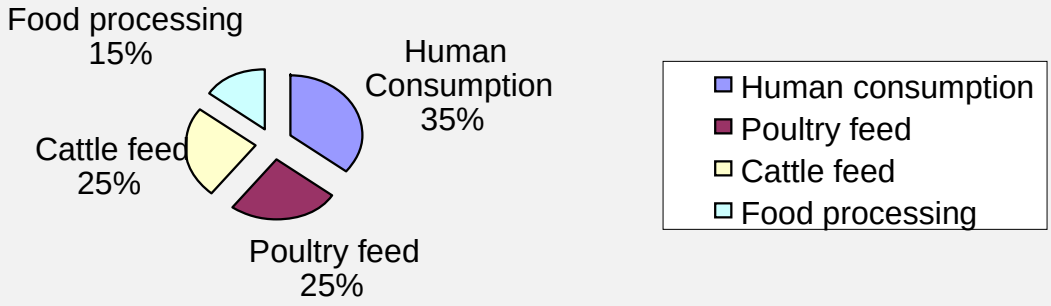


Consumption pattern

Maize is used for a variety of purposes ranging from human consumption to cattle feed and industrial uses. The major share of maize produced in the developed countries is either used for production of ethanol or production of feed for livestock. Globally maize accounts for 15 per cent of the world's proteins and 19 per cent of the calories derived from food crops.

In India, maize is used for human consumption (35%), poultry feed (25%), cattle feed (25%) and industrial uses (15%). Direct human consumption of maize has declined over time, while feed and industrial uses have increased. Rising household incomes have shifted consumption of maize to other cereals like rice and wheat. They have also led to an increased consumption of meat, particularly of poultry, which has increased the demand for maize as feed. Increased industrial demand for maize comes primarily from the starch industry.

Figure 5: Consumption pattern of Maize in India



Maize processing

Maize is one of the staple food items of poor families. Traditionally, the grain is converted into flour in mills for making bread. Immature cobs are roasted and eaten all over the country. It is an important raw material for animal and poultry feed and corn flakes manufacturing units. But the quantity of maize used by these units is limited as the existing units are of small scale nature. They make only a few products having limited demand. Hence, an alternative large scale unit which can process a large quantity of maize to different value added products is required to be set up.

Methods of maize processing

Maize is usually processed by two distinct processes, namely wet milling and dry milling. Dry milling produces grits, corn flour and minimum amount of corn meal. The technology has been standardized by Central Food Technological Research Institute (CFTRI), Mysore. The technical know how is available with CFTRI on payment. The service for turn key project is also available with the institute. Dry milling units have a crushing capacity of 10 MT/day with a project cost of Rs.20 lakh. Such units can be set up any place depending upon the availability of raw material, power and suitable land**.**

Dry milling

In dry milling the maize kernels are screened, tempered with hot water/steam to loosen the germ and bran. Then it is de-germinated to remove the germ. The husk is separated by means of aspirators. The de-germed maize is dried to a moisture content of 15-15.5 per cent followed by sifting. It then is subjected to milling to produce grits, meal and flour. The germs separated is dried and passed through an expeller to produce the corn oil. The different products that result from dry milling are as under:

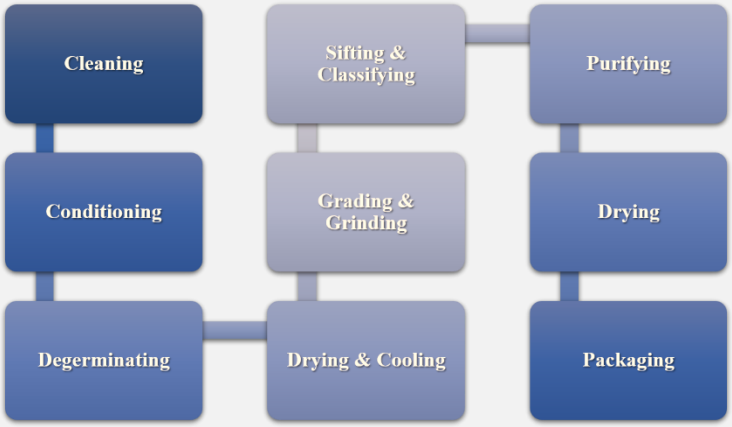
S. No.	Product	Share (%)
1	Grits	40
2	Coarse meal	20
3	Germ	14
4	Fine meal	10
5	Flour	5
6	Hominy feed	10

CFTRI has developed a mini mill for dry milling of maize. The grits is the main product of dry milling process, which is used as porridge by boiling domestically. The processing units use grits for manufacture of products like ready-to-eat snacks (corn flakes), wall paper paste and manufacture of glucose by direct hydrolysis. The process flow of dry milling is as under:

Wet milling

Maize is generally processed to manufacture corn starch by wet milling method the world over. The by-products of starch manufacture, like corn oil, corn steep liquor, gluten etc. are the important value added products.

Figure 6: Flow chart of dry milling



Manufacturing corn flakes

Corn flakes are one of the important value added products manufactured out of yellow and white maize. It is generally eaten as a breakfast cereal and the demand for this product comes from hotels from big cities. It is a product of dry milling, which is manufactured by flaking of the major grain after extraction of germ. The flaked grain is either roasted for manufacturing corn flakes, breakfast cereal or fried to manufacture corn flakes served as snack foods. The raw flakes are also used for manufacture of beer. There are only a few companies like Mohan Meakin, Ghaziabad and Kellogs, whose brands of corn flakes are very popular in Indian market. A brief process flow of corn flakes is given as under:

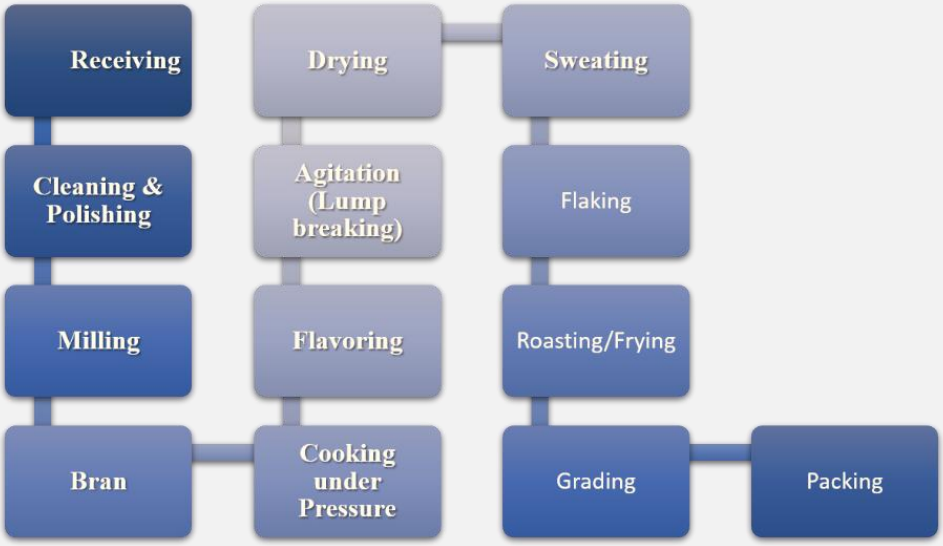


Figure 7: Flow chart for manufacturing Corn Flakes

Investment requirement

- A corn flakes unit of 300 MT per annum will require an investment of Rs.50 lakh.
- The plant and machinery is available in India.

Market for maize products

- The starch is the main product of a maize processing unit, which is consumed in various other industries like food, pharmaceuticals, textiles, paper, hotels and restaurants, etc.
- The other products include Gluten, Germ, Fiber (husk) and Corn Steep Liquor.
- Gluten has great demand in animal feed industry because of its high protein content (70%).
- Germ is used to extract germ oil which is low cholesterol containing edible oil.
- Fiber, mainly the husk, is used by animal feed manufacturers. It has demand in wet form itself for animal feed.
- Corn Steep Liquor is one of the substrates for culture media for manufacturing of antibiotics and other microbial production systems.

Major markets in India

In India, Mumbai, Delhi, Ahmedabad and Kolkata are the major markets for processed maize products. Other important markets include Bhopal, Hyderabad, Chandigarh, Lucknow, Bangalore etc. Most of the starch manufacturers of Gujarat, Maharashtra, Punjab, etc., have their marketing offices in Mumbai. Ahmedabad and Mumbai are the major trading centers for corn starch in India.

- Maize processors directly sell their products to the consumers like pharmaceutical industries, hotels, textiles, paper industries, etc. and through traders as well.
- Most of them have their marketing offices in metros and big cities for direct sale. They also sell through trading agencies as well. These traders restrict marketing of the products of one or a few companies and prefer to procure different maize products from a single supplier
- Starch and Gluten have good export potential.
- India exports these products to Sri Lanka, South East Asian countries, Bangladesh and South Africa.

Maize production in Orissa

Maize is the second largest cereal crop [after rice] in the state in terms of area under cultivation and production. Maize is cultivated in nearly 2 lakh hectares with a total production of 3.19 lakh MT. Most of the cultivation happens in Kharif season .Orissa accounts for nearly 2.4% of the area under the crop and 2.1% of total maize production in the country. The productivity of the crop is 1602 kg/ha comparable with the national average of 1783 kg/ha. Maize accounts for nearly 4.29% of total cereal production and 3.89 % of the total food grain production in the state.

Table 2: Major cereal crops in Orissa: 2006-07

	Area in 000 ha	Production in 000 MT
Rice	4450.32	6928.11
Wheat	16.8	23.78
Jowar	9.5	5.82
Bajra	2.39	1.4
Maize	**199.45**	**319.48**
Ragi	189.73	144.25
Millets	20.28	9.28
Total cereals	**4888.47**	**7432.12**
Total Food grain	**6839.86**	**8297.98**

Source: Compiled from Orissa agriculture statistics-2006-07

Table 3: Maize production in Orissa: 2006-07

Maize Production in Orissa 2006-07				India	% Share
	Kharif	Rabi	Total		
Area in 000 ha	190.13	9.32	199.45	7770	2.4
Yield in Kg/ha	1575	2147	1602	1783	--
Production in '000 MT	299.47	20.01	319.48	13850	2.1

Source: Compiled from Orissa Agricultural statistics-2006-07

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Source: Compiled from Orissa Agricultural statistics-2006-07

Table 4: Share of Maize in Total cereals and food grain: 2006-07

Share of Maze to total cereals and food grain production:2006-07				
	Area in 000 ha	% Share	Production in 000 MT	% Share
Maize	199.45		319.48	
Total cereals	4888.47	4.08	7432.12	4.29
Total food grain	6839.86	2.91	8297.98	3.85

Source: Compiled from Orissa Agricultural statistics-2006-07

Profile of the Nabarangpur district

Nabarangpur is one of the districts in the KBK region of the state. The district was formed in 1992 by splitting the erstwhile Koraput district. It is located in the Southwestern corner of Orissa. It is bounded by the state of Chhatisgarh to the west and north and districts of Kalahandi and Rayagada to the east and Koraput to the south. The district has a total geographical area of 5294 Sq. Kms. which is 3.4% of the state's geographical area. The Forest land occupies almost 45% of the total geographical area of the district. The district comprises of one subdivision, one municipality 10 Development Blocks ,Tahsils, 169 Grama Panachayats and 897 villages. The district has a population of 1018171(2001 census). More than 70 % of the population belongs to scheduled caste and Scheduled Tribe communities. [SC (14%) and ST (54%)]. The literacy rate is 34.14% which is very low compared to the state average of 63%. The district is one of the poorest districts in India with a total of 1,34,463 BPL families. The district is predominantly rural with more than 90% of the population living in rural areas.

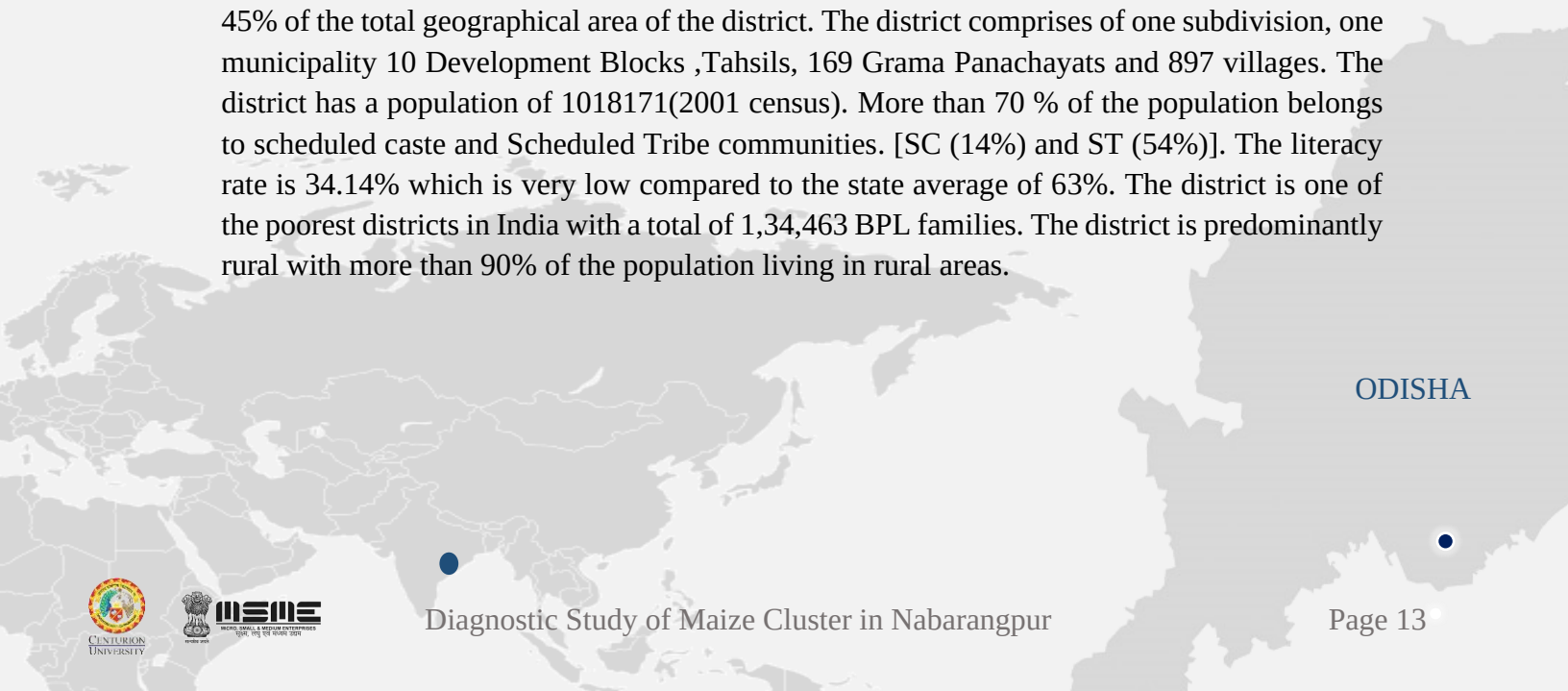

Table 5: Profile of Nabarangpur district

Particulars	-------
District office Nabarangpur has been functioning w.e.f.	02.10.1992
Geographical area	5294.0 Sq.KM
Total forest area	1583..4 Sq.KM
Reserve forest area	535.335 Sq.KM
The Cultivable area	1,85,824 ha
(a)Single crop	1,47,132 ha
(b)Double crop	38,692 ha
(C)Irrigation area	29823 ha
(d)More than 2 crops	NIL
Population as per census 2001	10,18,171
(a)Male	5,11,004
(b)Female	5,07,167
Population growth rate	20.6 %
Density of Population as per Sq.km	192
Total No. of BPL Families as per 1997 Survey	1,34,463
Literacy (As per 2001 Census)	
(a)Male	28.10 %
(b)Female	9.01 %
No. of sub divisions	01
No. of Tahasils	04
No. of Municipality	01 (Nabarangpur)
No. of NAC	01 (Umerkote)
No. of Blocks	10
No. of RI circles	61
No. of police stations	10
No. of gram panchayats	169
No. of revenue villages	887
Annual rain fall	16912.57 MM
Normal rain fall	1631.40 MM
No. of irrigation projects	39
(a) Major	--
(b) Medium	02
(c) Minor	37

Source: compiled from the source, www.nabarangpur.nic.in

Agriculture scenario of the district

Agriculture is the major economic activity of the people in the district. Cereals and pulses are the major food crops grown by the people. Among the cereals crops, maize is the second largest crop in the district and is cultivated nearly 40000 hectares with a production of 1.25 lakh MT. Other important cereals crops in the district include bajra, ragi, jowar and millets. Maize cultivation is the major source of income and employment of the people of the district. Table given below provides the size of landholding in the district. More than 80% of the farming families belong to small and marginal families.

Table 6: Size of landholding in the district

Size of holdings	No. of holding	%	Area (ha)	%
Less than 1 ha.	68602	53	35112	22
Between 1 to 2 ha.	35242	28	46562	29
More than 2 ha.	24079	19	79400	49
TOTAL	**127923**	**100**	**161074**	**100**

Source: Compiled from www.nabarangpur.nic.in

Table 7 : Agriculture scenario of the district

Crops	Area		%share of Orissa	Production		% share Orissa
	Nawarangpur	Orissa		Nawarangpur	Orissa	
Rice	164.33	4450.32	3.69	218.76	6928.11	3.16
Wheat	0.34	16.8	2.02	0.58	23.78	2.44
Jowar	0.18	9.5	1.89	0.1	5.82	1.72
Bajra	0.01	1.4	0.71	0.01	1.4	0.71
Maize	**40.67**	**199.45**	**20.39**	**124.6**	**319.48**	**39.00**
Ragi	0.05	4.05	1.23	6.97	144.25	4.83
Millets	0.7	20.28	3.45	0.33	9.28	3.56
Total Cereals	214.12	4888.47	4.38	351.35	7432.12	4.73
Total pulses	33.54	1951.39	1.72	17.12	865.86	1.98
Total Food grain	247.66	6839.86	3.62	368.47	8297.98	4.44

Source: Compiled from Orissa Agriculture Statistics-2006-07

Maize cultivation happens in approximately 40670 ha with an output of 1.25 lakh MT. The crop is basically a Kharif crop and is rain fed. The average productivity of the crop is high of 3064 kg/ha and has almost two times of higher productivity of the maize in the state. The quality of the crop is good in the district.

Table 8: Maize Production in Nabarangpur district

	Nawarangpur	Orissa	% Share
Area in 000 ha	40.67	199.45	20.39
Yield in Kg/ha	3064	1602	---
Production	124.6	319.48	39.00

Source: Compiled from Orissa Agriculture Statistics-2006-07

Maize Trading in Nabarangpur district

The food grain trade is not strictly regulated in the district. The maize procurement is largely controlled by the private traders and middle men across the state including Nabarangpur. Thus, the tribal farmers are subjected to unfair trade practices and not able to get remunerative price for their maize produce. Farmers sell their product in RMCs as well as private traders. The district has the presence of an RMC at Umerkote Block. Maize is one of the notified commodities to be traded through RMCs. Due to the tiny holding and small amount of crop per field coupled with inadequate transportation facilities, farmers face difficulties in bringing their product to RMCs. Most often they are forced to sell to private traders at a through away price. Traders offer a very low price to farmers and often cheat them in weighing. The price of maize in RMCs varies from Rs.350 per quintal to Rs.750 per quintal in different seasons**.**

The State government has entered into a MoU with NAFED on December 20, 2006 for creating suitable market linkages for procuring marketable agricultural commodities such as oilseeds, pulses and cereals etc. In the meantime, State Government has appointed NAFED as a state agent for procurement of paddy, maize and ragi during Kharif marketing season (KMS) 2007-08. The NAFED had started procurement of maize in the district during this season. The market intervention by the NAFED has helped the tribal farmers in the district getting higher price for their produce. The farmers could get Rs 740 per quintal in Kharif Marketing Season 2006-07 as against the Minimum Support Price (MSP) of Rs 540 per quintal fixed for the season.

Situation analysis of the maize processing cluster

- Umerkote block and its periphery, Umerkote, Raighar, Gursingha, Tuperbeda, Beheda, Chikalpadar, and Kurshi are famous for maize production in the district and is contributing large share of maize production in the district.
- The Maize farming in the district observed progressive growth since 1970s when migrated Bengali farmers started maize cultivation with improved varieties of maize. They used improved method for primary processing also. The Tribal farmers in this area were quick in adoption of the improved varieties of seed and processing techniques thereby increasing the production and productivity of the crop.
- There exist a number of large scale progressive maize farmers in the district who cultivate 10 acres to 100 acres per year. The farmers uses high yield varieties and so the productivity of the crop is very high compared to the state average.
- Major cultivation happens in Kharif season and the crop is generally rain fed. Irrigation facility is very limited. The farmers in Umerkote area largely benefits from the canal irrigation. In other areas farmers depend on wells for irrigation.
- Farmers employ tractors, power tillers for cultivation operation and transportation of products to farm yards for primary processing. Farmers are able to reduce the cost of cultivation through mechanization and improving the profitability of farming.
- Some of the farmers have their own maize processing and drying yards. Only primary processing is performed at the farm level. The farmers sell their products to private traders outside the district.
- Farmers face difficulties in bringing their products to the market due to inaccessibility of the fields with road.
- Maize trading in the district is monopolized by few traders outside the district who in turn supply the raw materials to the processing plants outside the state.
- Farmers are subjected to exploitation of the unfair trade practices adopted by the traders. Most often the price of the commodities adjusted to the repayment towards credit due to the traders, repayment for supply of fertilizers pesticides, seeds etc. In most cases farmers are forced to sell their products to a particular trader even though the market price is high.
- Recently NAFED had started procurement of maize from the district. It seems that since the farmers committed to sell their product to private traders on account of credit received, farmers are not able to benefit out of the operation of NABARD.

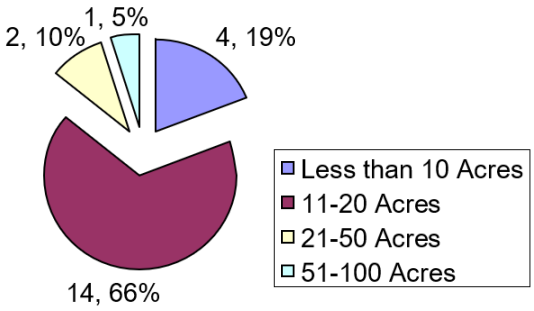

Figure 9: Area under Maize cultivation in acres

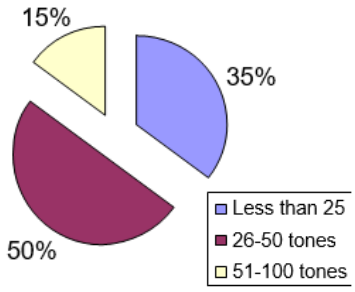

Figure 10: Maize production in tones

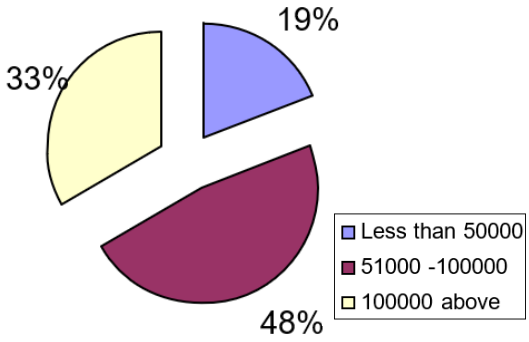

Figure 11: Investment in Rs

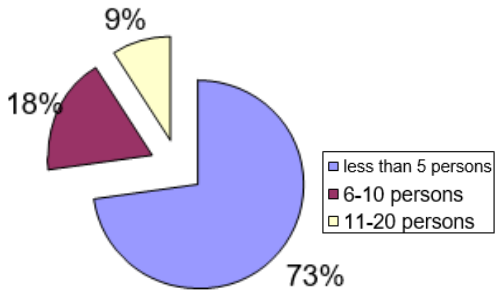

Figure 12: Number of persons employed

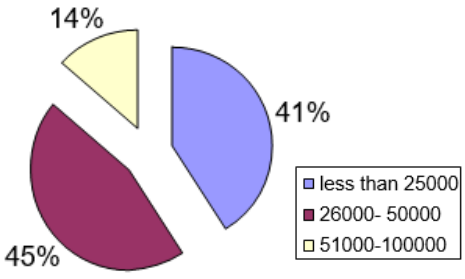

Figure 13: Loan amount in Rs

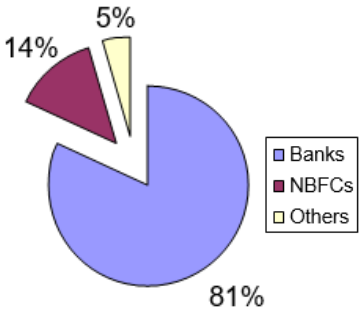

Figure 14: Sources of Loan

Key cluster stakeholders:

Following are the key cluster stakeholder whose collective action may transform the maize processing cluster in the district.

- Maize farmers
- District Agriculture Office
- District Industries Center
- RMC
- NABARD
- NAFED
- Financial institutions
- Seed suppliers
- Fertilizer dealers
- Equipment and machinery providers
- Traders
- Maize processing industries
- Cattle feed manufacturing units
- Poultry feed manufacturing units
- Food processing industries
- Pharmaceutical industries

Issues facing the cluster

A cluster stakeholder workshop was conducted with the objective of finding out the major issues facing the cluster and identifying solutions to those issues. The participants pointed out the following issues which could be addressed for future growth of the cluster.

- Inadequate irrigation facilities constrain the farmers to limit the crop in Kharif season only, even though the crop can be raised in Rabi season as well.
- Inadequate information of high yield varieties of seed and improved farming practices. Most often farmers have to depend on private traders for seeds and are often cheated on quality of seed supplied by them.
- There is no fertilizer depot operating in this area. Most of the farmers depend on private dealers for fertilizers. Many of the farmers are not benefiting the subsidies provided by the government.

- There is absolutely no storage facility available for the farmers and major portion of the crop is spoiled by unexpected rain in summer. In most cases farmers were forced to distress sale due to lack of storage facilities.
- Lack of marketing support: Farmers face difficulties in facing selling their products. Maize trading in this district is monopolized by few private traders from outside the district. The existing trade practices are exploitative. The farmers are not able to realize the market price since most of them are unaware of the prevailing market price or MSP due to inaccessibility of timely market information.
- Weak transport infrastructure: Most of the fields are inaccessible with road. Farmers face difficulties to bring the product in the market and so often forced to sell the crop in the field itself at low level of price.
- Poor power supply: Farmers face extreme difficulties due to the erratic power supply. Those farmers who have bore well for irrigation were not able to irrigate their field due to low voltage and erratic power supply. Poor power supply also constrained the farmers in performing primary processing of the crop also.
- Inadequate credit facility. Most of the farmers still depend on traders and money lenders for credit at high rate of interest and unfavorable repayment practices. In most cases farmers were forced to sell their crop to the traders and getting price of their crop after deducting the advance and interest. Commercial banks and financial institutions fail to address the credit requirement of the farmers.
- Farmers reflected that they are facing difficulties in getting quality seeds and fertilizers, irrigation support, power supply for irrigation, and soil testing. Departments like electricity department, agricultural department, irrigation department. etc are unable to address the issues facing the farmers.
- Lack of processing facilities: Due to lack of processing facilities for maize, the maize trading in the district is with almost near zero value addition. The farmer groups present in the district perform only primary processing and drying. There is no large scale units for processing and value addition.

SWOT analysis of the maize processing cluster

Maize processing cluster in this district offers tremendous potential for future growth. There exist opportunities for setting up of large scale maize processing units in the cluster. A SWOT analysis of the cluster is provided in the following lines.

Strengths

- Availability of raw material: Maize is one of the major crops in the district and there is a strong raw material base for the processing units. At present maize is traded with near zero value addition.

- The Directorate of Maize Research (DMR), a government body, promotes and coordinates maize research. In recent years, the DMR has successfully promoted a number of high-yielding maize varieties
- Presence of a large number of progressive farmers with willingness for maize cultivation.
- Conducive agro climatic condition.
- Marketed surplus: Maize is becoming one of the cash crops for the farmers. A major portion of the product [Marketed surplus] is sold in the market. Since there is no substitute for the crop particularly in rain fed condition the farmers will continue to produce the crop.
- Government support: Government of India has come out with the programs of Technology Mission for Maize and started supporting farmers to adopt improved varieties of seeds and other support services to increase the production and productivity. So the Maize cultivation will get more attention in future also. There will be greater motivation for increasing maize production.
- Ago-processing is one of the thrust areas of Government of India as well as well as state governments. There exists suitable packages and schemes are available for potential entrepreneurs.
- Increasing demand for maize as an ingredient in feed for the fast- expanding poultry and cattle feed industry.
- Wider use of products: Maize is used for human consumption, feed for cattle and poultry, production of cones, starch, and production of industrial alcohol etc. The product usage is very wide and is highly demanded in market. For example, maize starch is a preferred product compared to potato and tapioca starch.
- The productivity of the crop is very high compared to rice and other cereals. Higher the productivity, lower will be the cost of production.

Weaknesses

- Seasonality of the raw materials: Since maize is cultivated in Kharif season only the product may not be available for other seasons.
- Lack of storage facilities: There is no infrastructure facilities for storage of the products and the farmers are forced to distress sales with low remunerative process.
- Lack of systematic/ regulated marketing. No organised market/ single place for bulk procurement. Maize has to be procured from individual farmers or through middle men/traders which may hamper the regular availability or may cause price fluctuations.
- Exploitative trade practices: Farmers face difficulties in facing selling their products. Maize trading in this district is monopolized by few private traders from outside the district. The existing trade practices are exploitative. The farmers are not able to realize the market price since most of them are unaware of the prevailing market price or MSP due to inaccessibility of timely market information.

- Weak transport infrastructure: Most of the fields are inaccessible with road. Farmers face difficulties to bring the product in the market and so often forced to sell the crop in the field itself at low level of price.
- Lethargic attitude of government departments in extending support to farmers.
- Inadequate irrigation facilities.

Opportunities

- Opportunities for backward linkages with farmers through contract farming for ensuring high quality raw materials and availability of raw material.
- Increasing demand for products. Demand for maize is increasing. There exist considerable demand maize from manufacturers of industrial alcohol, poultry and cattle feed industries.
- Wider product usages and increasing demand for maize products
- Export potential as cattle feed
- Subsidies and grants from government for setting up of maize processing plants.
- Corn starch is identified as one of the ingredient of manufacture of biodegradable plastic. So there will be considerable demand for maize starch
- Corn starch is substrate for manufacture of alcohol, which has been identified as environmental friendly fuel.

Threats

- Seasonality of crop constraining the availability of raw material through out all seasons.
- Unfair trade practices of private traders and powerful buyer lobbying
- Low price realization and MSP
- Stiff competition from existing large scale maize processing plants in other states.

Proposed action Plan for the cluster

A three year action plan with the following activities is proposed for improving the maize processing cluster. Successful improvement of the proposed activities will result a dynamic maize processing cluster in the district.

Table 9: Proposed action Plan for the cluster

Sl No	Proposed activities	Year 1	Year 2	Year 3
1	**Backward linkages**			
i	Awareness creation on improved farming practices so as to minimize input costs and increasing output	✓		
ii	Strengthening farmer groups and social capital in the cluster	✓	✓	
iii	Liasoning with agricultural department, irrigation department, electricity department for the provision of improved seed varieties, fertilizers, subsidies, irrigation facilities, soil testing and ensuring regular power supply.	✓	✓	✓
iv	Laisoning with banks and financial institutions for increase credit flow to maize farmers	✓	✓	✓
2	**Organising Entrepreneurship Development Programs**			
i	Awareness creation on different governmental programs and assistance for maize processing	✓		
ii	Identification of potential entrepreneurs	✓		
iii	Facilitating registration of new processing units	✓		
iv	Networking with financial institutions and banks for facilitating credit flows to new units	✓	✓	✓
v	Organising exposure visits to successful maize processing units within and outside the state	✓	✓	
3	**Establishing common facility center(CFCs)**			
i	Setting up of procurement yards		✓	✓
ii	Drying yards		✓	✓
iii	Storage and warehouses		✓	✓
4	**Provision of Marketing support**			
i	Setting up of infrastructure for provision of market intelligence and market information		✓	✓
ii	Networking and liasoning with large scale maize processing units within and outside the state for supply of raw materials required by them.	✓	✓	✓
iii	Networking and liasoning with poultry and cattle feed manufacturing units for supply of raw materials required by them.	✓	✓	✓
iv	Organising buyer seller meets		✓	✓
v	Participation in trade fairs and exhibitions organized by Chambers of commerce and industry, Agriculture departments, Ministry of agriculture etc		✓	✓
5	**Establishing large scale maize processing units**			✓

iv	Organising buyer seller meets		✓	✓
v	Participation in trade fairs and exhibitions organized by Chambers of commerce and industry, Agriculture departments, Ministry of agriculture etc		✓	✓
5	**Establishing large scale maize processing units**			✓

Conclusion

The maize processing cluster offers tremendous scope for growth and development. Maize is a major crop cultivated in the district. Currently the product is marketed without much value addition. There exists potential for setting up of large scale maize processing units in the district. At present the maize is traded without much value addition. Considering the potential of maize processing in the district efforts should be made to provide infrastructure support for the maize farmers. One of the major problems facing maize producer in the district is absence of orgnised marketing. Even though NAFED is involved in procurement of maize through market yards, the farmers are not benefiting out of the effort. The lack of infrastructure support such as lack of motorable road constraints the farmer in bringing the products to the market. Reach of electricity is another problem facing the processing units.

Annexure I

Participants list
Maize workshop
Organized at Umarkot, District Nabarangapur
Dated. 27.03.2008

Sl. No	Name of the participant	Address	Contact Number
1	Mr. Vencent Kullu,	General Manager DIC, District Nabarangpur	9437908165
2	Mr. P. Ch. Behara	District Agriculture Officer, District Nabarangpu	9937868405
3	Mr. S. K Mishra	Industrial promotion officer, Umarkot Block, District Nabagrangpur	9437701137
4	Dulal Chandra Adhikari	U.V. No. 7, Nayaguda, Post : Siriguda	
5	Gokul Tarabdar	U.V. No. 7, Nayaguda, Post : Siriguda	
6	Dulal Mandal	U.V. No. 7, Nayaguda, Post : Siriguda	
7	Madhab Sarkar	U.V. No. 7, Nayaguda, Post : Siriguda	
8	Gourango Sarkar	U.V. No. 7, Nayaguda, Post : Siriguda	
9	Mansai majhi	Tuparbeda, Po> Chikka padar, umarkot	
10	Denish Adhikari	U.V. No. 7, Nayaguda, Post : Siriguda	9437679476
11	Bhimasen Nayak	Umerkot, District: Nabarangapur	9437300692
12	Sumen Chandra Mitro	U V 7, Nuagada, Post Cirliguda, Umarkot	9938394376
13	Swapan Sarkar	U V 7, Nuagada, Post Cirliguda, Umarkot	9938969938
14	Kishore Kumar sahoo	Rajamunda, Umarkot, District Nabarangapur	9437815356
15	Birendro Datt	U V 7, Nuagada, Post Cirliguda, Umarkot	
16	Anirudha Nayak	Main road , Umarkot, Nabarangpur District	9437380531
17	Bhagarathi Sethi	Durgaguda, umarkot, Dist Nabarangpur	9437374535
18	Rajib Datta	U V 4, Durgaguda, umarkot, Dist Nabarangpur	9938064164

Sl. No	Name of the participant	Address	Contact Number
19	Prakash chandra Mistri	U V 4, Durgaguda, umarkot, Dist Nabarangpur	9938064169
20	Rajan Sethi	U V 4, Durgaguda, umarkot, Dist Nabarangpur	9437616541
21	Siser Kumar Padhy	Umarkot , District Nabarangpur	9437322615
22	Prakash Malakar	U. V. 52, Umarkot, District Nabarang pur	
23	Denish Suter	U. V. 07, Nuagada , Umarkot, Dist. Nabarangpur	9938889051
24	Dharmadas Majhi	Tuparaguda , Umarkot, Dist. Nabarangpur	
25	Purno Chandra Majhi	Tuparaguda , Umarkot, Dist. Nabarangpur	
26	Sukhandro Badia	U. V. 07, Nuagada , Umarkot, Dist. Nabarangpur	
27	Sh. Sushanta Garuda	Denocratic action (NGO), Nabarangpur	06858-223132 9437238249
28	Nabin Chandra Sadhu	DOST (NGO), senapati street, Nabarangpur	9437785723
29	Biswajit Sarakar	U V 4, Durgaguda, umarkot, Dist Nabarangpur	9777255291
30	Krihna Chandra Sethi	U V 4, Durgaguda, umarkot, Dist Nabarangpur	9437524826
31	Anal Chandra Barik	U. V. 07, Nuagada , Umarkot, Dist. Nabarangpur	9938634939
32	Santosh Kumar Sutradhar	Kuthaguda, Umarkot, District Nabarangpur	9937726291
33	Rabindra Badia	U. V. 07, Nuagada , Umarkot, Dist. Nabarangpur	
34	Prakash Kumar Das	IYSARA (NGO) Chandahandi, Dist Nabarangpur	9437328707, 9437771314
35	Santosh sarkar	U. V. 07, Nuagada , Umarkot, Dist. Nabarangpur	9437470328

Appendix II

SME Interview Format

General Instructions

1. Start your study with a tour of the production/storage facilities of the unit
2. Start your discussion keeping the following format in mind

1	Date of Visit				
2	Name of Enterprise				
3	Name and Position of the Respondent				
4	Location				
5	Main product(s) of the Enterprise				
6	How many people are employed (Including Owners)				
7	Estimated total investment (Excluding land/buildings rented by the enterprise)				
08	Form of the enterprise (Sole proprietorship, partnership, family business, company etc.)				
9	Date of establishment				
10	Any other business fully or partly owned by the owners				
11	Where are the products sold (Volumes are to be calculated annually)				
		Name of the market			
		Product 1 (Volume)			
		Product 2 (Volume)			
		Product 3 (Volume)			

		Product 4 (Volume)			
		Product 5 (Volume)			
		Others (Volume)			
12	How does the state of business of the enterprise differ from younger units				
13	How does the state of business of the enterprise differ from other units established in the same year of establishment				
14	What are the other business which have important business relations with the enterprise				
15	Marketing channels used by the enterprise				List the names of subsidiaries for the channel members, if applicable
		Dealers			
		Carrying and Forwarding agents			
		Wholesalers			
		Retailers			
		Direct Marketing			
16	Apart from orders, what are the other things provided by these channels	Market intelligence			
		Design support			
		Market requirements			

		Technical assistance	
		Credit in money or materials	
17	What are the main product features used to attract customers (quality, customizing to customers' needs, quick delivery, advertising, price etc.)		
18	Is the emphasis shifting from one product feature to the other? Describe.		
19	Does enterprise require any kind of aid to enhance its business? If yes, then had it received any such aid in past. (Note the names and addresses of the aid providers.)		
20	Was it required to pay to get any such aid		
21	What are the enterprise's main problems in marketing	Selection	
		Quality	
		Price	
		Design	
		Transport cost	
		Lack of credit	
		Lack of market information	
		Others	
22	Who are the enterprise's main competitors (Note their names and addresses)		
23	Developments in the last 3 years		
24	What are the enterprise's future plans of up gradation /diversification /expansion		

25	Is the enterprise situated in an industrial estate? If yes, then who is the developer (small industry agency, local authority, SSI association, private party etc.)	
26	What are the other services, if any, provided to the enterprise by the developer	
27	Is the premise temporary	
28	From where, the enterprise has purchased its machines	
29	What is the average age of machines	
30	Who advised it to buy these machines (Note the names and addresses of the advisors)	
31	Who provides parts, servicing and repair services? Are they general mechanics or specialists in these types of equipments?	
32	What are the main problems with these equipments	
33	What are the main problems with the production processes	
34	Does the enterprise maintain a record of upgrading/diversifying its products/processes	
35	Does the enterprise specialize in one or two stages of a production process? (If the specialization is significant, then note the names and addresses of customers, specialist suppliers and common service facilities)	
36	Does the enterprise rely on other SMEs for supplies	

37	Is the specialization helpful for its business?	
38	Where did the owners/suppliers receive their basic training (Note the names and addresses of the training organisations/people)	
39	Does the enterprise maintain a record of all the training programs that its employees attend	
40	Does the enterprise feel significant problems with the existing level of skills of its employees	
41	Is the enterprise using any other source to train its employees? (Note the names and addresses of the training providers)	
42	What are the principal sources of raw materials? Are they local?	
43	Can the raw material suppliers offer any advice on the choice/use of raw materials	
44	What kind of technical support is provided by the suppliers	
45	What are the problems that the enterprise is facing from suppliers' side	
46	Has the enterprise received any help to resolve any such issues? (Note the names and addresses of the help providers)	
47	How was the enterprise funded in the beginning?	
48	How is the enterprise funded now?	
49	What kinds of credits does the enterprise receive? (Note the names and addresses of the creditors)	

50	What was the size of the credits received		
51	What was the rate of interest		
52	What is the date of the most recent credit		
53	Has the enterprise used third party services for securing external credit (Note the names and addresses of the service providers)		
54	Is the enterprise generating profits after considering all business costs including the income of owners		
55	What is the rate of increase of profit over the years for the enterprise		
56	Where do owners invest their profits	What form of expansion	
		Which other sector	
		What type of investment	
		What are the reasons for such investments	
57	What are the enterprise's main problems with finance		
58	What are the main sources for the enterprise to get infrastructure support	Electricity	
		Phone/fax/Internet	
		Water	
		Transport	
		Waste disposal	
		Effluent treatment	
		Fuel	
59	Has the enterprise received any cooperation from other SMEs in getting infrastructure		Nil

	support (Note names and addresses of all such cooperating SMEs)	
60	What are the infrastructural problems that the enterprise is facing today	Electricity
61	Describe the most serious problem, if any, that the enterprise have with laws and regulations	_.
62	Who has advised the enterprise to solve problems related to laws and regulations (Note names and addresses of the advisors)	IPO.Baliguda Block _
63	Is the enterprise a member of any business association? Note the name and place of the association.	No
64	How long the enterprise has been the member of the association	_
65	What kinds of services the enterprise has received from the association	_
66	How are the services offered by the association to the enterprise financed	-
67	How useful are the services provided by the association	_
68	What are the steps that can be taken to improve the services provided by the association	
To be filled by the Researcher		
Write three main problems faced by the cluster as observed by you. (Describe each problem in one sentence)		
Problem-1		. Financial problem.

Problem-2	Marketing problem
Problem-3	Designs and Lack of market information
Summarize in three lines, the enterprise's core competitive strategy and strengths and its most valuable interactions with other parties	
Core Competitive Strategy	
Core Strength	
Most valuable interaction	