



Study Report on Odisha



Prepared by the

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on behalf of the German project implementation consortium of



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1. Status of Agriculture and Allied Sector in Odisha – An Overview

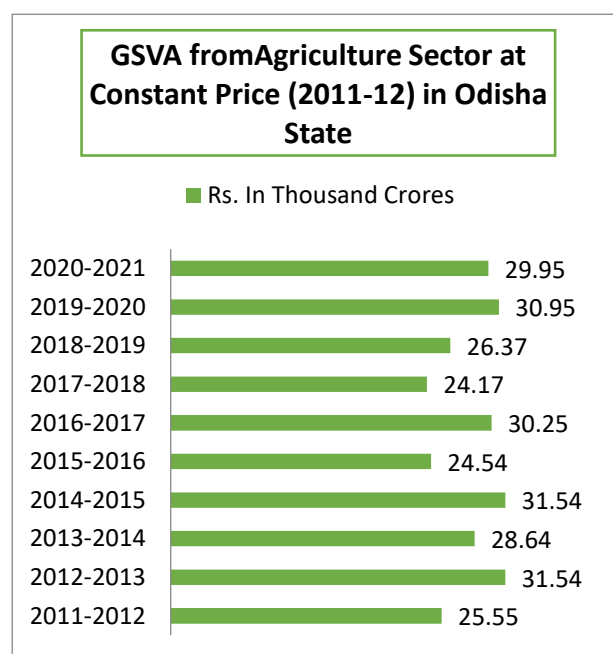
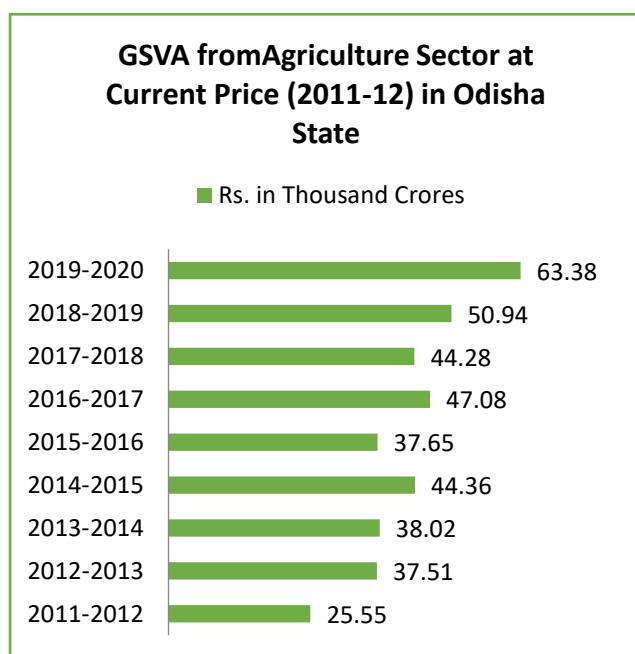
1.1. Economy and State of Agriculture in Odisha

The state of Odisha is endowed with abundant natural resources and rich biodiversity. The state has predominant agrarian economy with close to 60 percent of its population dependent on agriculture and allied activities to earn their livelihood contributing around 30 percent to the Net State Domestic Product. In 2020-21, agriculture (includes mining) contributed 26% of the economy. The sector contracted by 7.1 percent over the previous year¹. The share of agriculture in the gross state domestic product has declined from around 37% in 1992–93 to 21% in 2017–18², however, the number of persons engaged in agriculture remains high.

Odisha's economy is consistently growing at a higher rate compared to the national growth. During the last seven years, the average growth of Odisha has remained about 8% compared to national average of about 6.9%. In spite of a slowdown in the global and national economy, Odisha's economy is expected to grow at the rate of 6.16 per cent in 2019-20 well above all India growth rate of 5%.

With the policy of the State Government to promote industries and higher investment in the infrastructure sector along with a focus on the social sector, the State economy is estimated to grow in the range of 7% to 7.5% during 2020-21.

In Odisha state gross state value added by economic activity from agriculture sector is INR 29.95 thousand crore at constant price (2011-12) in 2021 and INR 63.38 thousand crores at current price (2011-12) in 2020.



¹ Available at: <https://prsindia.org/budgets/states/odisha-budget-analysis-2021-22#:~:text=Sector%3A%20In%202020%2D21%2C,and%2042%25%20of%20the%20economy.>

² Hoda A., Gulati A., Wardhan H., Rajkhowa P. (2021) Drivers of Agricultural Growth in Odisha. In: Gulati A., Roy R., Saini S. (eds) Revitalizing Indian Agriculture and Boosting Farmer Incomes. India Studies in Business and Economics. Springer, Singapore. https://doi.org/10.1007/978-981-15-9335-2_9

1.2. Key Agriculture and Horticulture Crops

The major crops grown in the state include rice, pulses, oil seeds, jute, coconut and turmeric. Odisha contributes one tenth of the total rice produced in the country. Other important food grains include pulses like gram, tur and arhar and Oilseeds like groundnut, mustard and castor oil. Apart from food grains various cash crops are also cultivated in the state. These include Jute, mesta, sugarcane, tobacco, rubber, tea, coffee and turmeric. These are cultivated across different geographical areas of Odisha. Odisha stands fourth in the production of jute in the country after West Bengal , Bihar and Assam. Rice and jute, compete with each other as they require almost similar soil and climatic conditions. Cultivation of jute is primarily confined to the coastal plains of Cuttack, Balasore and Puri districts.

The table below provides the detail regarding year wise production of major crops being produced in the state of Odisha, for past three years. The table indicates that there has growth in the production of cereals and similar trend has been witnessed or rice and ragi however production of maize has gone down from 752.57 thousand tonnes in 2018-19 to 733.41 thousand tonnes in 2019-20. On the other hand production of pulses has declined gradually over the past 3 years from 1075.97 thousand tonnes in 2017-18 to 1044.76 thousand tonnes in 2019-20. Similar trend has been witnessed for production of all vegetables taken together.

More or less similar trend has been witnessed for other crops as well where growth has not been constant. This further substantiate the fact that share of agriculture in total state revenue has been declining over the years and given the fact that majority of the population is still dependent on agriculture and allied services, the sector requires immediate attention from policy makers in terms of increasing return on investment. Such approach will also ultimately lead to increase in income of all the stakeholders associated with agriculture and allied sector.

Value chain development of some of the focus crops can be one of the methods to achieve this objective. This report is an effort to analyse various stages of value chain of some of the focus crops and draw insights regarding steps required for making the entire value chain more profitable.

Category	Commodities	Area in '000 ha.			Yield in kg/ha.			Production in '000 tonnes		
		2017-18			2018-19			2019-20		
		Area	Yield	Production	Area	Yield	Production	Area	Yield	Production
Cereals	Rice	3766	1739	6551	3859	2004	7734	3928	2453	9637
	Maize	247.61	2948	729.96	251.43	2993	752.57	254.14	2886	733.41
	Ragi	114.35	880	100.58	117.88	890	104.92	116.85	1102	128.73
	Total Cereals	4167.81	1777	7406.87	4273.06	2017	8618.02	4342.08	2424	10525.66
Pulses	Green Gram & Moong	894.23	487	435.47	837	491	410.61	825.6	495	408.29
	Black gram and Biri	519.62	482	250.47	489.16	486	237.76	434.72	483	209.87
	Arhar	137.89	897	123.69	144.06	1022	147.23	128.63	1124	144.58
	Total Pulses	2047.35	526	1075.97	1951.45	540	1053.85	1922.24	544	1044.76
Oilseed	Groundnut	198.01	1808	358.03	192.08	1796	345.06	204.82	1894	387.89
	Sesamum	203.72	399	81.26	202.99	402	81.56	200.43	411	82.31
	Mustard	109.57	435	47.66	106.3	436	46.35	109.98	440	48.41
	Total Oilseed	603.37	887	535.34	590.09	887	523.3	602.09	945	569
Vegetables	Potato	25.09	11880	298.06	24.68	11756	290.14	21.33	12255	261.39
	Onion	33.47	11334	379.34	33.09	11279	373.22	27.47	10613	291.55
	Sweet Potato	40.41	9429	381.04	40.31	9386	378.36	33.36	9439	314.9
	Total Vegetable	651.52	13780	8978.19	644.25	13802	8892.25	599.94	13628	8175.93
Other Plantation	Sugarcane	27	73565	1986.26	24.8	73119	1813.35	18.76	72798	1365.69
	Tobacco	0.31	572	0.18	0.19	692	0.13	0.13	692	0.09
		Area in '000 ha.			Yield in kg/ha.			Production in '000 Bale		
Fibres	Jute	4.37	2495	60.57	3.99	2208	48.94	3.66	2209	44.92
	Mesta	6.26	894	31.09	6.1	904	30.64	4.69	899	23.42
	Cotton	144.57	480	408.2	157.88	490	455.07	169.56	580	578.5
	Total Fiber	160.17	591	525.68	173.72	585	564.74	182.79	662	672.43

Figure 1: Area, Productivity and Production of Crops in Odisha

1.3. Agro-Climatic Conditions

1.3.1. Topography

The state has coastal plains, central hilly regions, central plateaus, flood plains, and uplands. Also, it has some major floodplains encompassing the river systems.

The western and northern divisions of the state are part of the Chota Nagpur plateau. The coasts are composed of fertile alluvial plains and the valleys of the Mahanadi, Brahmani, and Baitarani rivers, which flow into the Bay of Bengal. Odisha has plentiful natural resources and a large coastline. Odisha has developed as the most preferred destination for overseas investors. It contains one-fifth of India's coal, a quarter of its iron ore, one-third of its bauxite reserves.

1.3.2. Climate and Weather

The state experiences four meteorological seasons: winter (January to February), pre-monsoon season (March to May), south-west monsoon season (June to September) and north east monsoon season (October–December). However, locally the year is divided into six traditional seasons (or rutus): Grishma (summer), Barsha (rainy season), Sharata (autumn), Hemanta (dewy), Sheeta (winter season) and Basanta (spring)

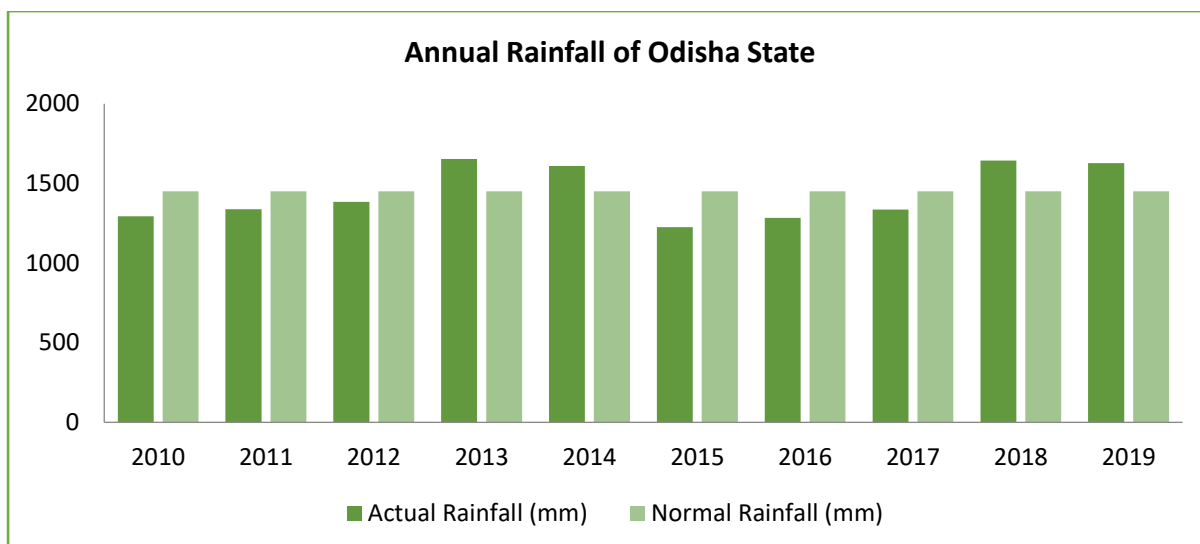


Figure 2: Annual Rainfall in Odisha

1.4. Principal Agriculture crops grown in Odisha

Crop	Characteristic
Rice	Rice is the principal food crop in the state occupying about 44.55 lakh ha annually (41.24 lakh ha during Kharif season and 3.31 lakh ha during Rabi season). The Kharif Paddy area consists of 10.43 lakh ha of high land, 15.99 lakh ha of medium land and 14.82 lakh ha of low land. The entire Rabi area is irrigated & covered by HY Paddy where as 36% of Kharif Paddy area is covered under irrigation.
Maize and Ragi	Maize & Ragi are the important coarse cereals. Jowar, Bajra & Small millets are also grown in the state to a lesser extent. These crops are mostly grown in tribal districts during Kharif in un-irrigated uplands with poor management practices and more as subsistence crop. The area under Ragi crop is showing a declining trend due to diversion of traditionally ragi growing areas to cotton, maize vegetables & pulses. So, improved & high yielding varieties of Ragi have been introduced in the state and Ragi development is being promoted though incorporating the scheme under work plan for enhancing the production & productivity.
Pulses	Arhar, mung, biri, kulthi, gram, fieldpea, cowpea and lentil are the pulse crops grown in the State. The major crops are arhar, mung, biri and kulthi. Pulses are grown mainly in uplands during Kharif season predominantly in inland districts & in rice fallows during Rabi season, mostly in coastal districts under available moisture condition. Mung & biri are also grown as third crop in summer under irrigated condition. Post monsoon rains, mostly govern the Rabi coverage of pulses in rice fallows.
Oil seeds	Oilseeds Groundnut, sesamum, castor, mustard, niger, sunflower, safflower, soybean, linseed are the Oilseed crops grown in the State. Of these, groundnut, sesamum, mustard and niger are the major ones. Now, sunflower is gaining popularity in the state. These crops are grown in upland during Kharif season and in riverbeds & rice fallows during Rabi season.
Jute and Mesta	Among the fiber crops Jute & mesta are the most important crops. Jute is mainly cultivated in the coastal districts of Balasore, Cuttack & Anandpur subdivision of Keonjhar. Mesta is mostly grown in the districts of Ganjam, Mayurbhanj, Keonjhar & Koraput.
Cotton and Sugarcane	Cotton is mostly grown in KBK districts (un divided Koraput, Kalahandi, Bolangir) and Ganjam. This crop is gaining more importance in the State. The present aim is

	to raise the area under cotton to 75,000 ha by substituting the crop in high land where non-remunerative non-paddy & paddy crops are grown.
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2. Value Chain Assessment of Focus Crops and Gap Analysis

Based on the information discussed, below is value chain analysis of some of the principal crops grown in the state of Odisha.

2.1. Rice

2.1.1. Rice Production in Odisha

Production scenario of major crop paddy in Odisha from 2014-15 to 2019-20 is presented in Table-2.4. During 2019-20, food grains contributed around 51% of the total crop production of the state. In 2019-20, the total food grains regain its contribution with a record 115.71 lakh MT production after 2017-18. Production of rice, the only major crop of the state, has increased from 77.34 lakh MT in 2018-19 to 96.37 lakh MT in 2019-20 registering an increase of about 60.71 percent.

Production of paddy in odisha (in'000MT)

Crop	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Rice	9845	5875	9794	6551	7734	9637

Table 1: Rice Production in Odisha

2.1.2. Identifying and Mapping Main Actors involved in Rice Value Chain

Various actors involved in rice value chain are input suppliers, growers, processors, traders and finally

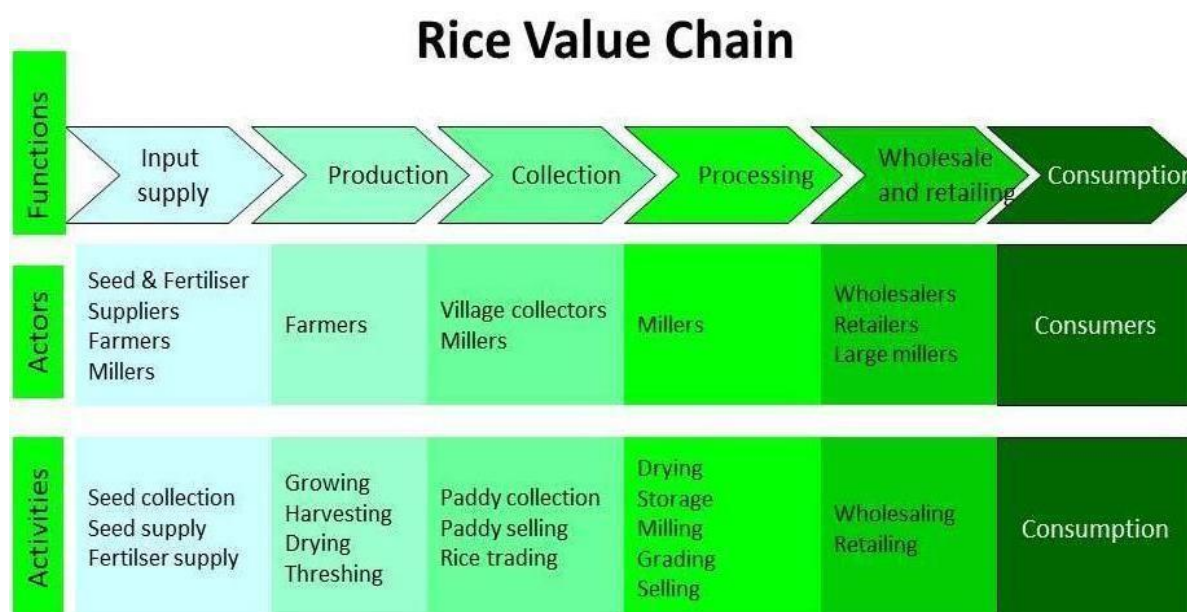


Figure 3: Systematic Value Chain Map of Rice

the consumers as shown in figure below.

2.1.3. Process Involved in Rice Value Chain

The core process of value chain of rice in the State of Odisha involves pre-production (supply of inputs), cultivation, post-harvest handling, agro-processing and marketing. Export and import are usually not seen in the State. Key inputs like seeds, manures, pesticides, labour, irrigation, credit and technology are used for production of rice. Post-harvest operations include harvesting, threshing,

cleaning and storing. Processing of paddy is made in mills or hullers to produce clean rice which is marketed through government procurement, mill owners, whole sellers and retailers till it reaches the consumers.

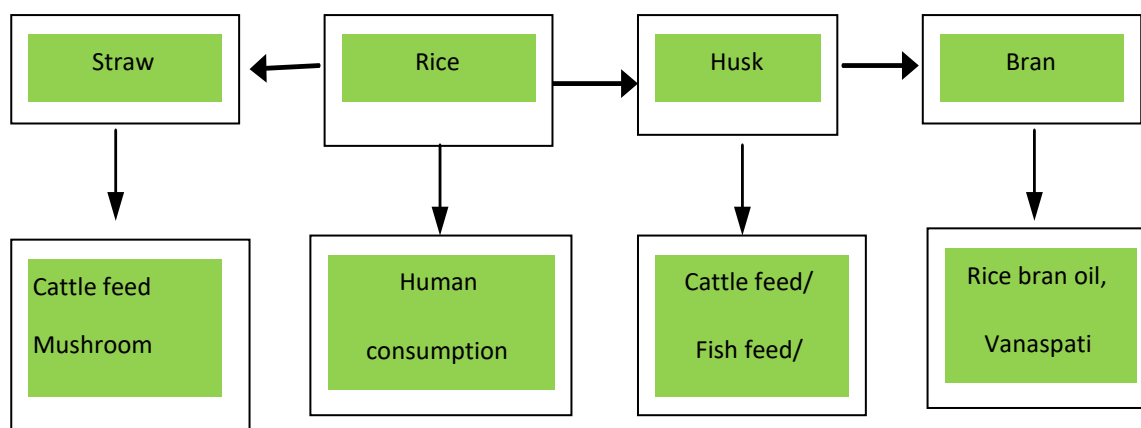


Figure 4: Core process of Rice Value Chain

2.1.4. Market Structure

The market map is made up of three inter-linked components: (i) local traders, millers and government, (ii) enabling environment in form of provision of infrastructure such as procurement centers, mills, administration of minimum support price, and (iii) service providers like government and extension service system. In most effective value chains the actors who actually form the chain (i.e. transact the main product) are supported by business and extension services from other enterprises and support organizations (e.g. seed suppliers and intermediaries). There is an on-going need for chain actors to access services of different types both market and technical. The third component of the market map framework is concerned with mapping these services that support, or could potentially support, the value chain's overall efficiency. The services that can potentially add value include input supplies (seeds, livestock, fertilizers etc.), market information (prices, trends, buyers, and suppliers), financial services (such as credit, savings or insurance), transport services from village to procurement centers, quality assurance and support for product development and diversification.

The various agencies engaged in the assembling of paddy / rice may belong to producer, village merchant, wholesale merchants and commission agents, rice mill agent, cooperative organizations and government organizations. Assembling and distribution system of marketing are closely related. The producer makes the movement of paddy from the farm to the assembling centers, while a number of market functionaries are involved in the distribution dealing with its subsequent movement to the final consumer.

2.1.5. Identifying and Mapping Main Actors Involved in Rice Value Chain

Various actors are involved in rice value chain. At the production level primary producers (farmers), input supplying agencies, extension personnel, government departments are involved. In post-harvest operations, the mill owners, FCI, Cooperatives etc are involved. In marketing, the commission agents, cooperatives, FCI, Food and Consumer Welfare Department, whole sellers and retailers are involved. Ultimately the consumers are the end users of the product.

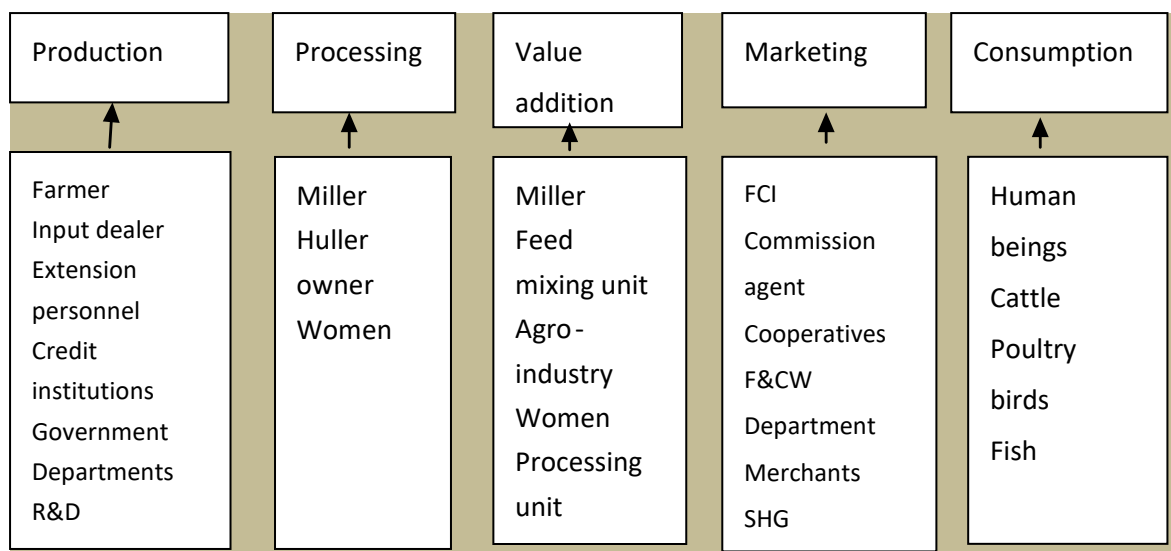


Figure 5: Actors in rice value chain of rice

2.1.6. Mapping Relationship and Linkage between Value Chain Actors

Relationship exists between different process steps (e.g. between producers and retailers). Farmers occupy a central position who is directly or indirectly linked to other actors as both forward and backward linkage exists in the value chain. Various services like training on cultivation, training on management and forwarding market information are necessary at different levels.

2.1.7. Constraints and Opportunities

Due to its shallow root system and high water requirement the crop is very often exposed to severe moisture stress at the critical growth stages. Rice is also cultivated in acid and degraded soils as a result of which assured yield is not achieved. The farmers seldom apply ideal proportion of nutrients to meet the crop requirement. Due to hot and humid climate rice crop during Kharif suffers from severe pest attack which causes severe crop loss. Smallholder rice farmers are locked into a near subsistence farming situation presenting few opportunities for enterprise and income diversification. They have limited opportunities to grow crops that would complement the staple rice diet and thus improve family nutrition status. Various market constraints are as follow:

- Spurt in production and heavy arrivals
- Lack of marketing information
- Adoption and grading
- Inadequate storage facilities in rural areas
- Transportation facilities at producers' level
- Training of producer
- Financial problem
- Inadequate infrastructure facilities
- Middleman ship

There are many ways of utilization of rice and its by-products such as starch, rice bran, rice bran oil, flaked rice, puffed rice, parched rice, rice broken, rice husk and rice seed. There is tremendous scope to take up cultivation of aromatic rice, exportable non-aromatic rice, organic rice and processed rice products. Export opportunities are available for such rice and rice-products.

Constraints/ Opportunities	Input	Production	Procurement	Processing
Constraints	• Inadequacy of quality seed	• Technological gap	• Lack of skill on FAQ	• Inadequate infrastructure

	<ul style="list-style-type: none"> • Imbalance in use of nutrients • Inadequate credit support • Non-availability of appropriate machinery • Inadequate irrigation 	<ul style="list-style-type: none"> • Poor communication system • Poor REF linkage • Non-availability of skilled/ trained laborer • Limitations in soil Drudgery 	<ul style="list-style-type: none"> • Want of storage facility • Post-harvest loss • Transport difficulty 	<ul style="list-style-type: none"> • Non-availability of modern rice mills • Poor recovery
Opportunities	<ul style="list-style-type: none"> • Scope for seed village scheme • Benefits under NFSM • Hybrid seed production • CIG's/FIG's involvement in input procurement 	<ul style="list-style-type: none"> • Implementation of NFSM • Extension Reform (ATMA) & PPP • Insurance cover • Organic rice • Aromatic rice production • Suitable varieties released from OUAT/ CRRRI 	<ul style="list-style-type: none"> • Scope for improvement in MSP • Collectivization at village level 	<ul style="list-style-type: none"> • Group finance for processing units • Government assistance/ incentives

Table 2: Constraints and Opportunity in Rice Value Chain

2.2. Maize

2.2.1. Maize Production in Odisha

The table below provides detail regarding production of maize in Odisha from FY 2014-15 to FY 2019-20. As it is evident from the figures production of maize has come down.

Production of maize in odisha('000MT)						
Crop	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Maize	751	666	746	730	753	733

Table 3: Production of Maize in Odisha

2.2.2. Market Assessment

Most of maize production is sold in local village markets, where grain prices are lower than those in the nearest regulated market. As indicated above the grain prices in the local markets are still lower than the government-established Minimum Support Price. Farmers continue to sell their produce in the local village market because: (1) when grains are sold outside the village, transportation costs tend to be higher than marginal returns due to price difference, and (2) farmers tend to sell to local traders, especially if they need to pay back any loan they may have taken out to purchase inputs and for consumption purposes. Farmers were of the opinion that there is no other reliable way to sell their produce, as the volume is often very low. Recently toasted maize has a demand in urban areas.

2.2.3. Mapping of Maize Value Chain

The core process of value chain of maize in the district involves pre-production (supply of inputs), cultivation, post-harvest handling, agro-processing and marketing through different channels. Key inputs like seeds, manures, pesticides, labor, irrigation, credit and technology are used for production of maize. Post-harvest operations include harvesting, threshing, cleaning and storing.

Primary processing of maize is done in mechanical and manual methods without use of any maize Sheller since the quantity is less. The possibility of maize value chain involving core processes is given in figure below:

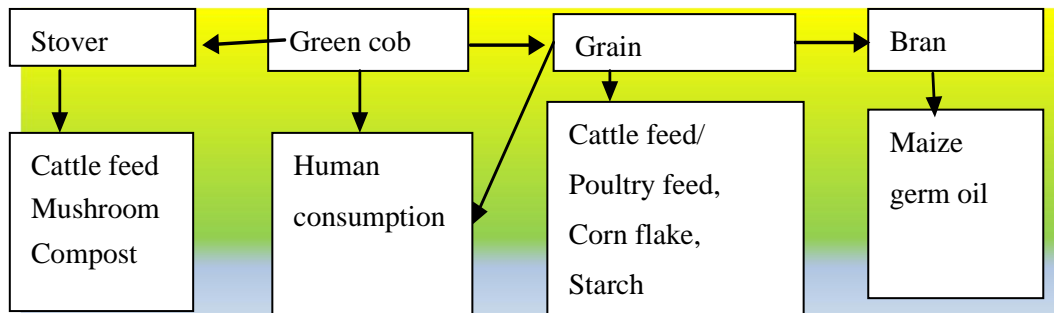


Figure 6: Maize value chain involving core processes

2.2.4. Identifying and Mapping Main Actors Involved in Maize Value Chain

The main actors involved in the value chain are input suppliers, farmers, extension personnel, traders including cooperatives, TDCC and government. Ultimately the consumers are the end use of the product.

Input Supply	Input dealers	Supply of fertilizer, seed, pesticides and machinery
Access to Finance and Technology	Credit Institutions (Formal & Non-formal)	Providing of credit
	OUAT	Research & Development, Extension
	Agriculture department	Extension, Demonstration and supply of critical inputs
	NGOs	Technology transfer and supply of inputs
Production	Farmers	Field management and cropping related activities & Storage
	Agricultural Laborers	Wage labour for field operations
Collecting and Marketing	Farmers	Transport to hat, procurement centres
	TDCC	Procurement from aggregators/ farmers
	Commission agent	Collecting and aggregation
	Cooperatives/ SHG	Procurement and supply to Wholesalers/ TDCC
Consumption	Human population, Cattle, Poultry birds	Purchase of maize & feed and utilization to produce value added products for human consumption and industrial use

Table 4: Value Chain Actors and their Roles

2.2.5. Mapping Relationship and Linkage between value Chain Actors

Relationship exists between different process steps (e.g. between producers and retailers). The relationship is shown in figure below:

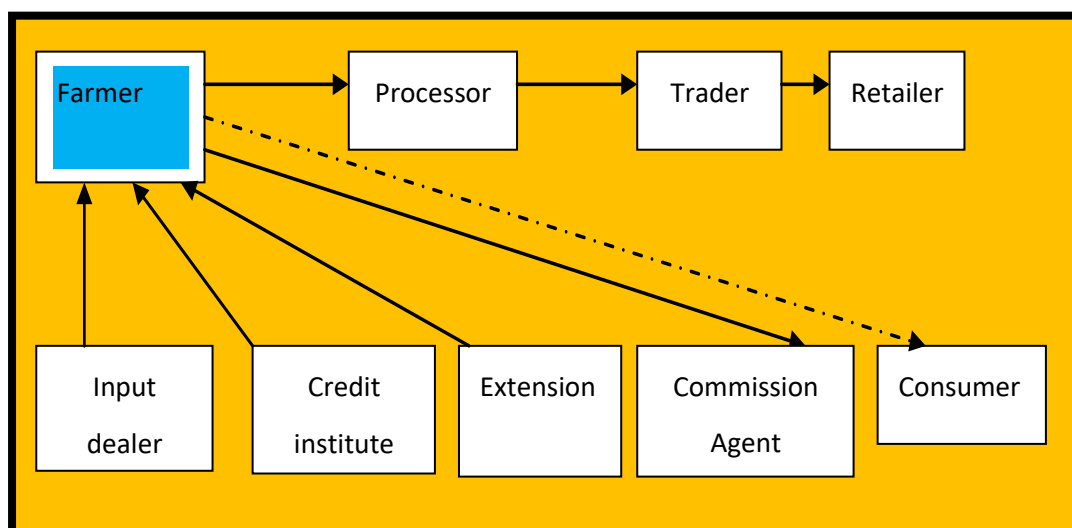


Figure 7: Mapping of relationship in maize value chain

2.2.6. Constraints & Opportunities in Maize Value Chain

Constraints/ Opportunities	Input	Production	Procurement	Processing
Constraints	<ul style="list-style-type: none"> • Inadequacy of quality seed • Imbalance use of nutrients • Inadequate credit support • Non-availability of appropriate machinery • Inappropriate irrigation • Non-availability of safe chemicals 	<ul style="list-style-type: none"> • Technological gap • Poor communication system • Poor REF linkage • Non-availability of skilled/ trained labourer • Limitations in soil • Drudgery 	<ul style="list-style-type: none"> • Lack of information on marketing • Weakness in implementation of MSP • Want of storage facility • Post-harvest loss • Transport difficulty 	<ul style="list-style-type: none"> • Inadequate infrastructure • Non-availability of maize processing units • Poor recovery
Opportunities	<ul style="list-style-type: none"> • Scope for seed village scheme • Hybrid seed production • Scope of sweet corn • Cultivation of high protein maize 	<ul style="list-style-type: none"> • Implementation of Government schemes • Extension reform (ATMA) • WSD in rain fed areas 	<ul style="list-style-type: none"> • Scope for improvement in MSP • Collectivization at village level 	<ul style="list-style-type: none"> • Group finance for processing units • Government assistance

Table 5: Constraints and Opportunities in Maize Value Chain

2.3. Ragi

2.3.1. Ragi Production in Odisha

Ragi is an important cereal crop in Odisha. It is the richest source of calcium, iron, and protein which makes it more important for health. The table below provides detail regarding production of ragi in Odisha for past three financial years.

Commodities	2017-20	2018-21	2019-22
Ragi	100.58	104.92	128.73

Table 6: Ragi Production in Odisha

2.3.2. Mapping the core process of value chain

The core process of value chain of Ragi in the district involves pre-production (supply of inputs), cultivation, post-harvest handling, agro-processing and marketing. Key inputs like seeds, manures, pesticides, labour, irrigation, credit and technology are used for production of Ragi. Post-harvest operations include harvesting, threshing, cleaning and storing. Processing of ragi is made in mills or

by locally available stone grinders. The value chain and processing of ragi are shown in figures below.

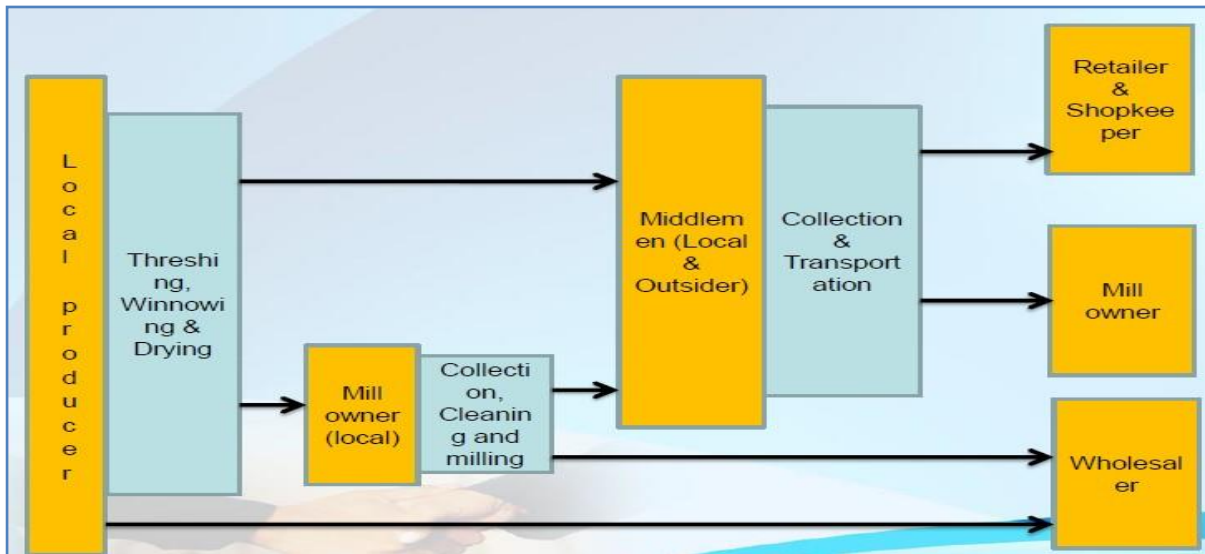


Figure 8: Value Chain of Ragi

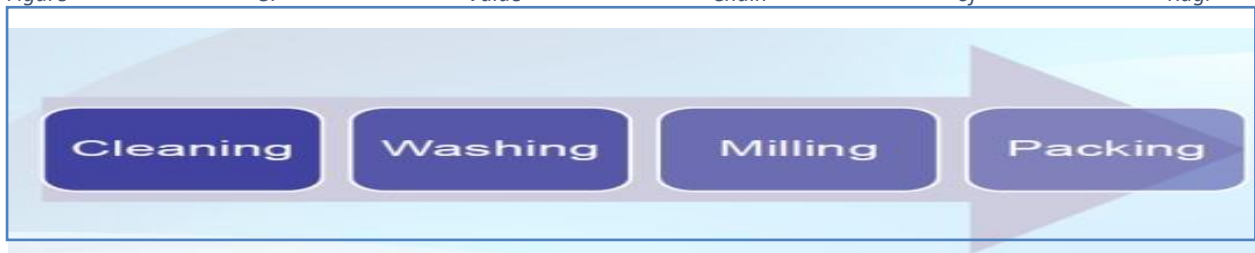


Figure 9: Processing of Ragi

2.3.3. Identifying and Mapping Main Actors Involved in Processes

Activity	Actor	Role
Input Supply	Input dealers	Supply of fertiliser, seed, pesticides and machinery
	WR Department	Supply of irrigation
	Credit Institutions (Formal & Non-formal)	Provision of credit
	Extension Personnel	Transfer of Technology
	Ouat & ICAR Institutions	Research & development, extension

	Agriculture department	Extension, demonstration and supply of critical inputs
	NGOs	Technology transfer and supply of inputs
Production	Farmers	Field management and cropping related activities & Storage
	Agricultural Laborers	Wage labour for field operations
Processing	Mill owner	Feed processing
	Women	Shelling
Collecting and marketing	Farmers	Transport to hat, RMC, procurement centres
	TRIFED	Procurement from farmers
	Commission agent	Collecting and aggregation
	F&CW Department	Procurement and distribution
Value addition	Pvt agencies	Processing & feed mixing, oil extraction
Consumption	Human population	Purchase, processing and consumption

Table 7: Main Actors in Ragi Value Chain

At the production level primary producers (farmers), input supplying agencies, extension personnel, government departments are involved. In post harvesting operations the mill owners, FCI, Cooperatives etc are involved. In marketing the commission agents, cooperatives, FCI, Food and Consumer Welfare Department, whole sellers and retailers are involved. Ultimately the consumers are the end users of the product.

2.3.4. Mapping of Volume

The volume of products is closely linked related to mapping of product flow. It varies with different channels.

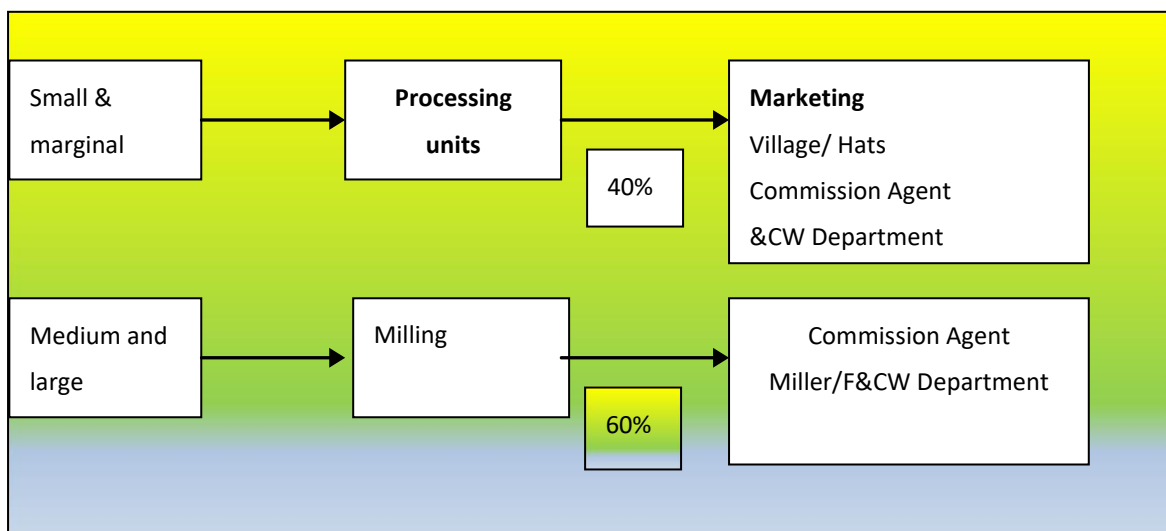


Figure 10: Volume Mapping of Ragi

2.3.5. Mapping Relationship and Linkage between Value Chain Actors

Relationship exists between different process steps (e.g. between producers and retailers). The relationship can be spot-marketing or persistent.

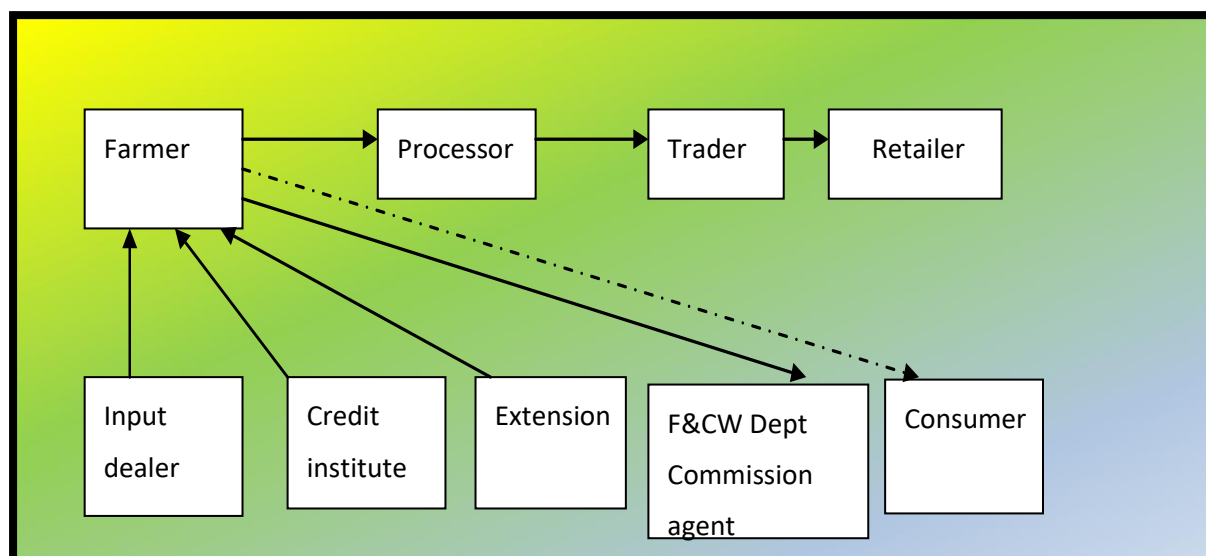


Figure 11: Relationship between Value Chain Actors

2.3.6. Constraints and Opportunities in Ragi Value Chain

Constraints/ Opportunities	Input	Production	Processing	Marketing
Constraints	<ul style="list-style-type: none"> • Inadequacy of quality seed • Imbalance use of nutrients • Imbalance use of nutrients • Non-availability 	<ul style="list-style-type: none"> • Technological gap • Poor communication system • Poor REF linkage 	<ul style="list-style-type: none"> • Lack of modern processing facilities • Poor recovery • Poor quality 	<ul style="list-style-type: none"> • Lack of information on marketing • Weakness in implementation of MSP • Want of storage

	<ul style="list-style-type: none"> of appropriate machinery • Inappropriate irrigation • Non-availability of safe chemicals 			<ul style="list-style-type: none"> facility • Post-harvest loss
Opportunities	<ul style="list-style-type: none"> • Scope for seed village scheme • Benefits of Ragi • Development • Seed exchange programme and seed bank 	<ul style="list-style-type: none"> • Extension Reform (ATMA) • WSD in rain fed areas 	<ul style="list-style-type: none"> • Scope for improvement in MSP administration • Collectivisation at village level 	<ul style="list-style-type: none"> • Group finance for processing units • Government assistance

Table 8: Constraints and Opportunities in Ragi Value Chain

2.4. Vegetables

2.4.1. Production of Vegetables in Odisha

The area and production scenario of different major growing vegetables and spices in Odisha from 2014-15 to 2019-20. In 2019-20, the production of vegetable have been inclined significantly over the previous year. Also the increasing trend of area under the vegetable may be the indication of successful indication of crop diversification and awareness programme and farmers' consciousness towards economy.

Crop	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Vegetables	9403	9068	8974	8978	8892	9753

Production of vegetables in Odisha ('000MT)

2.4.2. Supply chain of Vegetables in Odisha/Main Value Chain Actors

Table 9: Vegetables Production in Odisha The fresh vegetable passes through multiple channels and routes before reaching to the end consumer. There are different categories of intermediaries operating in vegetable supply/distribution chain, catering to different markets and segments of customers. The survey findings indicate presence of six vegetable marketing channels, involving a set of different players with their own characteristics as shown in figure below:

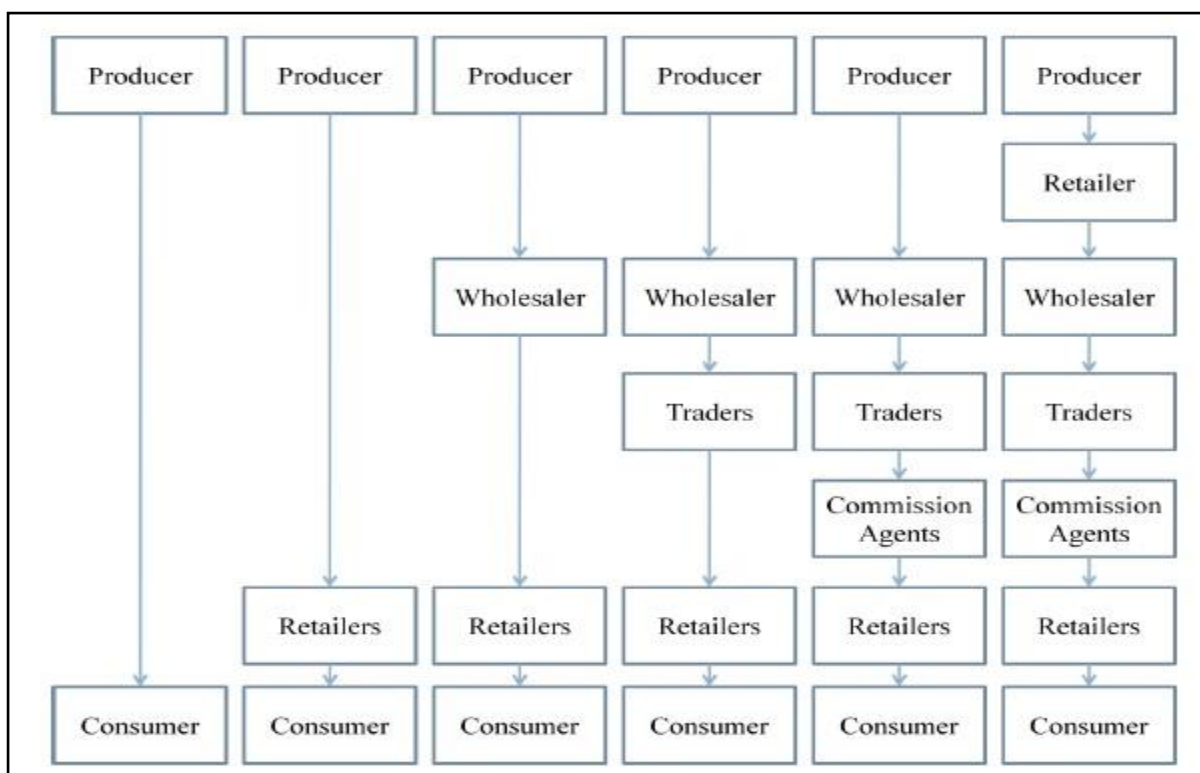


Figure 12: Supply Chain of Vegetables in Odisha

2.4.3. Profile of Supply Chain

Intermediary	Function/profile	Average volume	Destination market
Primary Aggregator (I)	Collects vegetables from door to door, targets small producers who produce for HH consumption, uses bicycle/baskets for transport.	50–100 kg	Village traders, nearby hats & markets
Village Traders	Collects vegetables from farmers and village aggregators. Do sorting grading, packaging and transportation. Also acts as representatives of CA/ wholesalers/ retailers.	As per demand, generally 3050 quintals (pick up van, Tata-407)	Wholesalers/ Retailers in different consumption centre.
Traders (Vegetable Loader)	Operate in big mandi/ aggregation centre.	As per arrival, 50-200 quintals	Commission agents in big cities. Their role becomes important when a specific vegetable is not available in local area and the produce has to be brought to market from a distant place.

Commission Agent	Operate at secondary aggregation centre\ terminal market. Act as a trade facilitators, does price negotiation, and provide credit facility and market information to different actors.	As per arrival	Wholesalers and retailers operating at terminal market. Sometimes traders and also forward to distant terminal markets.
Retailers	Retailer is the last – link in the chain of middleman who sells directly to the consumer. The retailers buy vegetables from the producers/ village traders/ traders or wholesalers.		They sell to the consumers directly. They normally hold the stock for maximum period - 1 to 3 days

Table 10: Supply Chain Profile of Vegetables

2.4.4. Mapping Main Actors Involved in Processes

The main actors involved in the value chain are input suppliers, farmers, extension personnel, wholesalers, commission agents, transporters, retailers and ultimately the consumers.

Activity	Actor	Role
Input Supply	Input dealers	Supply of fertiliser, seed, pesticides and machinery
	Credit Institutions (Formal & Non-formal)	Providing of credit
	OUAT	Research & Development, Extension
	Agriculture department	Extension, Demonstration and supply of critical inputs
	NGOs	Technology transfer and supply of inputs
Production	Farmers	Field management and cropping related activities & Storage
	Agricultural Laborers	Wage labor for field operations
Marketing	Primary aggregator	Collection from farm gate
	Village traders	Local trading
	Wholesalers	Collection from aggregators and mandi and supply to retailers
	Commission agents	Operate in secondary aggregate centers and terminal markets
	Retailers	Purchase from wholesalers and selling to consumers
Consumers		Consumption

Table 11: Main Actors Involved in Value Chain

2.4.5. Constraint and Opportunities

S.N	Constraints	Strategy
1	Adoption of poor crop production technology leading to low production	<ul style="list-style-type: none"> • Use of Hybrid varieties under intensive cultivation • Integrated pest and nutrient management • Use of micro-irrigation • Strengthening service delivery of extension • Encouraging farmers' group / agriculture commodity groups to engage in vegetable production in a collective manner • Organizing existing women farmers by collectivizing them into Producer Companies/cooperatives for large scale production and profit making • Participatory technology development and capacity building of women farmers
2	Price fluctuation	<ul style="list-style-type: none"> • Encouraging farmer organization/commodity groups to create local marketing centers • Communication of market information • Staggered planting of vegetables • Establishing direct linkage between rural market and urban consumers and end consumers • Arranging buy back arrangements for farmers' produce • Regular interface of producers and traders to mitigate frequent price fluctuations
3	Poor post-harvest technology	<ul style="list-style-type: none"> • Capacity building of growers on post-harvest technology • Operation of cold stores and cold chain system • Value addition and agro-processing • Practicing organic farming system
4	Unorganized vegetable marketing	<ul style="list-style-type: none"> • Opening of vegetable market complex in urban areas • Establishment of cold chain transport through refer vans • Formation of vegetable growers' societies
5	Poor backward and forward linkage	<ul style="list-style-type: none"> • Strengthening agricultural credit system • Cash and credit system of financing • Collective marketing by vegetable growers • Stress on economy of scale through aggregation and production enhancement • Quality consciousness

Table 12: Constraints and Opportunities

3. Available Infrastructure and Future Prospects for Development of Value Chains in Odisha

3.1. Industrial Promotion in Odisha

Facilitating industrial investments through providing ready-to-use infrastructure can play very decisive role in terms of developing value chains of focus crops in Odisha. To this pursuit, a large number of industrial estates, industrial areas, IT Parks, Theme Parks have been established in different strategic locations of Odisha.

Infrastructure facilities like roads, drains, power supply, water supply and other common facilities have been provided. Developed plots and built-up sheds are allotted to entrepreneurs intending to set-up their industrial ventures at attractive rates.

- ✓ 108 industrial Estates / Areas in strategic locations
- ✓ Industrial Growth Centres at Kalinganagar,
- ✓ Jharsuguda, Chhatrapur and Kesinga
- ✓ IID Centres at Khurda, Paradeep and Rayagada
- ✓ Food Park at Khurda
- ✓ Ekamra Haat, Bhubaneswar
- ✓ Infocity, Bhubaneswar
- ✓ Exhibition Ground, Bhubaneswar
- ✓ Seafood park at Deras
- ✓ Plastic Park at Paradeep
- ✓ Electronics Park at Bhuban
- ✓ Infovally, Bhubaneswar

The state government has largely been concentrating on marine exports. The Seafood Park at Deras (outskirts of Bhubaneswar) is being operationalised with an investment of Rs 134 crore. The units will be processing fish, shrimps and prawns for domestic and overseas markets, the official said.

As per the recent study, the total investment opportunities in agro and food processing sector in Odisha is Rs 12 billion with a potential to grow at a Compound Annual Growth Rate (CAGR) of 11 per cent.

With more than 25,000 food & allied MSMEs and around 1.3 lakh people employed in the sector, the state government has taken large strides to make the state an ideal investment destination for agro & food processing sector.

3.2. Key Market Players and their Investment in Odisha State

3.2.1. Britannia

Britannia Industries Limited will invest Rs 94 crore for the expansion of its manufacturing plant in Odisha's Khurda district to cater to the growing demand for its products across multiple categories.

The company will deploy its investment of Rs 94 crore to add two new manufacturing lines that will increase its capacity by 85 per cent from the current 35,000 metric tonne to 65,000 metric tonne per annum.

The new capacities will be operational by October, 2022 and enable the company to increase production of its core brands including Marie Gold, Vita Marie Gold. Moreover, the new production

lines will enable us to cater to the growing demand within Odisha and strengthen our presence in the eastern parts of the country

The expansion is also part of the company’s commitment to support the state government’s vision to develop Odisha as a manufacturing hub, Berry added. The existing facility in Odisha currently employs 700 people and after this expansion the company will additionally employ up to 450 people taking the total number to 1,150. The expanded facility will feature fully automated processing and packing lines, as well as the latest warehousing infrastructure to optimize supply chain and quality management.

3.2.2. ITC

Diversified group ITC will set up an integrated consumer goods facility and a five star hotel in Odisha at an investment of Rs 800 crore.

The integrated consumer goods manufacturing facility is being built on an area of 700,000 sq ft at Khordha district in Odisha. The firm will roll out ITC's food brands like Aashirvaad, Bingo, Sunfeast, YiPPee! .

ITC's investment in the processed foods sector in Odisha will add significant value to the state's agricultural potential. ITC believes that food processing sector can make a multi-dimensional contribution to the state by enhancing competitiveness of food value chain, encouraging sustainable agriculture, reducing agri-wastages and helping create livelihoods along the entire value chain.

ITC's FMCG businesses support livelihoods for over 7 lakh people in the state and also has been engaged deeply with farmers in Odisha. The company has also been supporting local entrepreneurs and farmers to try new table potato varieties by providing agronomy support and supplying early generation seed potato and in Cuttack, Mayurbhanj, Bhadrak, Balasaur, Puri and Koraput districts.

3.2.3. Indo-Nissin Foods

Japanese food processing giant Indo Nissin Foods is in the process of setting up its second unit in Odisha’s Khordha, which will be their largest unit in India.

Indo Nissin Foods with its brands such as Top Ramen has been operating out of Khordha Food Park for the last 30 years. The noodle maker has so far invested \$20 million in its manufacturing units in Odisha and will continue to do so.

3.3. Agri-food market Infrastructure and Logistics

3.3.1. Construction of 1,12,500 MT godown

The High Level Committee (HLC), Govt. of India has approved for construction of 1,12,500 MT godown by the OSWC at 17 locations in 15 districts of the State. The above construction work is being undertaken by the Central Warehousing Corporation as the implementing agency. The construction of 50,000 MT has already been completed and work for 42,000 MT godown is in progress and expected to be completed within March, 2013. Work for remaining godown capacity of 20,000 MT will be commenced shortly. These additional 1,12,500 MT godowns will be utilized by the Odisha State Civil Supplies Corporation Ltd. under six years guarantee reservation scheme of Food Corporation of India.

3.3.2. State wise plan for construction of Godowns

Selected State-wise Capacity Plan for Construction of Godowns by Central Warehousing Corporation (CWC) in India (2020-2021)
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States	Capacity (In MT)
Andhra Pradesh	10750
Gujarat	19274
Haryana	14800
Karnataka	10400
Kerala	4300
Madhya Pradesh	10600
Maharashtra	15772
Odisha	8325
Rajasthan	35000
Uttar Pradesh	13250
India	142471

3.3.3. SWOT analysis of the State Agri-food system

Strength	Weakness
<ul style="list-style-type: none"> • Availability of Raw material • Good infrastructure facilities such as warehouse, cold storage, power, transportation etc • Availability of labours • Export • Government schemes and subsidies 	<ul style="list-style-type: none"> • Seasonal availability of fruits • Large domestic demand for table consumption • Lack of funds to purchase/install machinery and equipment • Traditional approach • Lack of modern technology
Opportunities	Threat
<ul style="list-style-type: none"> • Value added products for fruits & vegetables, milk, meat and cereals & pulses • Increasing market span • Enhancement of Income and employment • More export earning • Entrepreneurship development in rural area 	<ul style="list-style-type: none"> • Price fluctuations • Global competition • Huge cost on modern technology • Unorganized markets • Bad trade practises

4. Assessment State Agri-Food Market

4.1. State Agri-food Market Development Opportunities

4.1.1. Supply related opportunities

- Encourage farmers to adopt proven best practices for cultivation such as mulching and drip irrigation.
- Conduct training and capacity-building for farmers on postharvest management of produce, including encouraging them to adopt modern sorting, grading, and cleaning practices and increasing farmer awareness on quality and standards.
- Promote and strengthen farmer collectives to enable them to undertake aggregated sales and marketing and dissemination of advanced technologies among members.
- Expose farmers to other trading platforms such as eNAM and encourage them to use web-based applications such as agriculture market information systems for real-time market intelligence, especially grade-specific pricing and transparent price discovery.

4.1.2. Demand related opportunities

- The quality of produce sold by farmers is considered low as a result of factors such as lack of uniformity in grain size, percentage of moisture, and presence of impurities. Thus, investment in facilities for sorting and grading to ensure market standards would lead to an increase in price realization for farmers
- Create dry and cold storage infrastructure to cater to the requirements of smallholder farmers for storage of their produce.

4.1.3. Policy and regulatory related opportunities

- Strengthen market intelligence and price discovery mechanisms for providing real-time information on fruit/vegetables/cereals/pulses/dairy/poultry arrivals and grade-specific pricing at different markets within and outside the state to help increase farmers' value realization by enabling them to make well-timed sales.
- Establishment of incubation centre at district level
- Establishment one cold storage and dry storage unit at district level
- Capacity building and training programme to traders, processors, farmers etc.

4.1.4. State Agri-Food Market Development Opportunities

Value chain level	Drivers of change	Possible Supply related interventions	Possible Demand related interventions	Possible Policy / Regulatory related interventions
Production	Improving Productivity	Precision farming; Digital agriculture to improve input use efficiency; Alternative farming techniques	Blockchains to connect crop planning to commodity markets	Innovation grants and subsidies; Enhanced knowledge & market intelligence platforms
	Improving quality	Improved on-farm harvest techniques (e.g., sorting & grading produce to increase quality consistency & shelf life)	Enhanced consumer market intelligence and data sharing	Improve access / support for quality certification
	Enhancing economies of scale	Farmer producer group formation / expansion	Clarification of product / market standards & requirements	Group certification grants/ subsidies
Agri-logistics	Quality control & loss reduction	Technologies to enhance product traceability across targeted value chains	Leveraging technology for implementation of agri-logistics platforms	Innovative investment schemes and grants;
	Efficient storage & distribution	Intermediate collection points / storage & commodity transport hubs (Farmer group owned); enhanced linkages to food parks		Grant / credit programmes to promote investment in efficient storage & distribution systems/ services
Food Processing	Food safety	Technologies to increase shelf life (e.g., waxing of fruits; irradiation treatment for meat)		Control of food hygiene standards; containment of borne diseases; Improving compliance with labelling standards and packaging standards to ensure freshness
	Automation in manufacturing	Enhanced automation & predictive maintenance to reduce dependence on manpower/ improve efficiency	Scale up capacity in-line with demand through predictive analytics to be able to react to demand fluctuations	Promotion of processing support through national marketing campaigns / schemes

Food Distribution	Consistent & reliable supply	Real-time connectivity between processors & distributors for faster market access		Food produce transportation and storage standards
Food Retail	Convenience & reliability	Packaging and quality branding	Integrated online & offline processes to enhance consumer browsing & shopping experiences	Control of food hygiene standards; containment of borne diseases; Improving compliance with labelling standards and packaging standards to ensure freshness
	Consumer engagement	Farmer direct marketing and sales operations	Enhanced consumer buying behaviour data mining systems; Niche market short supply chains; Leveraging technology to create collaborative & local networks	
Food Services	Convenience	Farmer direct marketing and sales operations	Predictive analysis to predict consumer demand & enable data-led decisions /efficiency gains	Regulation of standards for on-line food delivery platforms
	Consumer engagement	Point of sale promotions; Food service provider farm visits	Digital platforms for just in time ordering / home delivery	
Food consumers	Health & nutrition	Dynamic and agile service delivery models		Consumer surveys; Public awareness campaigns;
	Sustainable products	Low input farming / water and land use efficiency		Promotion of sustainability through 'Made in (regional/ geographic/ national branding)' schemes; Cross-compliance policy frameworks for access to grants/ subsidies

5. Overall Recommendations

Furthermore, along with the crop specific recommendations we have also proposed a set of recommendations that are relevant across crops.

5.1. Support for capacity building & strengthening of farmers

Lack of capacity of the farmers have been a major challenge. There is a huge scope in development of capacities of the farmers and farmer collectives in terms of cultivation best practices, post-harvest practices, enterprise and operations management, market intelligence, knowhow of e-marketplaces and digital marketing services, market development and branding. Considering this, the following interventions are proposed for capacity building & strengthening of farmers & their collectives.

5.1.1. Capacity building & training of farmer collectives

It is imperative that FPOs are formed and suitable capacity building and institutional handholding support is provided to the FPOs in form of mentorship and trainings programs, along with know-how and ability (including retail licensing) for providing agri-inputs & technical advisory to farmers. It is proposed that these training and institutional handholding support shall be funded by the State Government through implementation partners which may be organizations working closely with farmer collectives.

5.1.2. Enterprise Management & Operation handholding

It is proposed to identify suitable candidates from the progressive farmers as well as leadership of the FPOs and train them in enterprise management aspects including preparation of business plans & operational manuals. It is also proposed to create FPOs and provide financial assistance to certain FPOs to hire professionals for critical roles in the FPOs, where candidates are not available internally.

5.1.3. Market Intelligence & Price Discovery

Farmers in general they have very little information on the prices that are being offered for their produce in the wholesale markets. This is particularly acute in case of awareness of grade specific pricing. A significant volume is traded through pre-harvest contracts which involves a high amount of estimation work from the trader. In most of cases, the farmer ends up on the losing side as they have limited information on price and demands trends etc.

Hence, market Intelligence and market information services (especially grade specific pricing) are essential to ensure maximizing the farmer margins. In this regard, it is proposed to make available various web/app based models of Agriculture Market Information Systems (AMIS) to the farmers and their collectives. These information systems should provide accurate market information to the farmers free of cost. The grade specific information should be including in the systems as it is a critical component which can contribute to higher value realization by the farmers.

5.1.4. Training of farmer and collectives on best cultivation practices, e-marketplaces/ auctions & other digital marketing services

Farmers lack proper training on best farm management practices including productivity enhancement techniques such as high-density plantation, INM, Soil Moisture Management (mulching), cultural practices such as weeding, etc. and post-harvest handling to extend shelf life and maintain quality. There is also an urgent need for training on e-marketplaces/ auctions and other digital marketing services. It is proposed that various training programs in on these topics in line with the nationally accredited skill qualification frameworks will be provided to the farmers as per their specific requirements. In case, accredited skill training programs are not available for certain topics, the same may be developed for the training purpose.

5.1.5. Leveraging economics of scale by linking farmer collectives through processing & marketing FPCs

In order to leverage benefits of economies of scale, building farmer collectives and then collectivizing the farmer collectives under Farmer Producer Companies (FPCs) is very important. Such FPCs would play the role of a processing and marketing company. Such collectivization increases bargaining power of the farmers for marketing, helps them to raise capital for setting up of processing facilities and reduce operational cost of such facilities.

5.1.6. Brand & Market Development and Export Promotion

Key marketing challenges faced by farmers include lack of direct access to buyers, low farm gate prices due to limited marketing options, etc. Focus on developing marketing development for farmers and their collectives will help them to access different markets by bypassing middlemen and hence ensure better returns.

Various market development and access initiatives including developing FPO-owned brands (including improved packaging), promoting quality/ organic certifications, encouraging collective members to attend exhibitions, national conferences, workshops, etc. for displaying their products and linkage development may be promoted with support of private sector agri-businesses and other relevant organizations.

5.2. Technical Assistance for Promotion of SMEs

5.2.1. Developing skillsets

It is necessary to build a labour pool trained in roles like floor level workers, operators, packaging and assembly line workers. This will also help in improving local employment.

5.2.2. Dissemination of Innovative Practices, Technology & Tools

Promotion of innovations in agriculture sector is critical for upgradation of value chains. Such innovations can improve productivity, reduce wastages, reduce cost, increase shelf life and improve product quality that would fetch higher returns. This would include adoption of global Good Agricultural Practices along with low-cost technology at farm-level such as solar water pumps, auto-regulated micro-irrigation systems, hydroponic systems of cultivation, fertilizer deep placement technology, etc.

5.3. Support for facilitating overarching development

5.3.1. Access to finance and Creation of Venture Capital Fund

One of the key challenges faced by farmer collectives and other private agri businesses is access to favorable credit for term loans and working capital requirements. Majority of financial institutions and commercial banks generally seek a minimum collateral of about 150% to 200% of loan value from the collectives. It is very difficult to arrange for collateral of such values leading to unavailability of loan for setting up of value addition/ processing facilities. Moreover, in some Government Subsidy Schemes, such as Cold Chain Scheme and Scheme for Creation of Backward and Forward Linkages (Ministry of Food Processing Industries), term loan of a certain percentage of the project cost is a mandatory eligibility criterion. Due to the inability to raise bank loan, many of the farmer collectives are unable to avail subsidy under these Schemes for developing infrastructure for storage and forward & backward linkages.

Similar is the case for working capital loans. Interactions with private agribusiness also revealed similar challenges faced in terms of availing bank loans. Considering this, it is recommended that soft

loans (both term and working capital) at 4-5% interest rates should be provided to farmer collectives and agri-business private companies.

There is an acute need for seed/ venture capital along with enterprise incubation especially for startup agribusiness ventures. Such enterprise/ business incubation would provide a nurturing, instructive and supportive environment during the critical phase of new business by supporting the startups to overcome their lack of business skills and inadequate finance. Experience of having such funds and incubation support for agribusiness startups in other states have shown encouraging results.

It is recommended to establish a Venture Capital Fund for expansion & valuation, technology induction, marketing, etc. specifically for social agri-business enterprises. The Fund will extend financial support through equity infusion, debt or convertibles through identified incubators in the state, which would also provide incubation support. A suitable fund manager should be appointed to manage the proposed fund and provide the required mentoring support and along with financial due diligence.

5.3.2. Innovation in Post-Harvest & Market Access

Post-harvest innovations stimulate agricultural production, prevent post-harvest losses, and add value to agricultural produce, thereby opening new marketing opportunities and enhancement of farmer incomes. It is proposed that suitable post-harvest interventions shall be identified and supported for promotion. For example, solar/ biomass powered small pre-coolers and cold storages at the farm level can be supported to reduce wastages at the farm level. These units can be owned by farmer collectives and would be used by the member farmers.

5.3.3. Creation of quality standards

There is a need to standardize the quality parameters grade (size), appearance, colour, etc. of crops, which influence the pricing and also helps in maintaining the quality of commodities. These standards should be widely disseminated so that all stakeholders including farmers and their collectives, trader/intermediaries and consumers have a shared understanding of the same.

5.3.4. Market development through promotion of digital e-market places and export promotion

It is proposed to encourage market development through promotion of digital e-market places and export promotion. Various initiatives could be undertaken to enhance marketability of produce across the state. Several Government and private sector promoted e-market places are already operational in India. Special packages to promote these e-market places should be undertaken.