

Export Oriented Value Chain Study

Turmeric - Odisha

Prepared by:

Raghvendra Singh

Pratyush Ranjan Singh

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Executive Summary

Commodity Profile

Turmeric (*Curcuma longa* L), the ancient and sacred spice of India is known as 'Indian saffron'. It serves as an important commercial spice crop grown in India. It is used in diversified forms as a spice, flavouring and colouring agent and as a principal ingredient in Indian culinary as curry powder. The increasing demand for natural products as food additives makes turmeric an ideal produce as a food colour.

Curcumin is the main biologically active phytochemical compound of turmeric. It is one of the three curcuminoids of turmeric and is extracted, concentrated and standardized for usage in several products. Curcumin gives yellow colour to turmeric and has a wide range of medicinal properties. It is a water soluble, orange-yellow coloured powder. The usage of curcumin in various products is gaining increasing importance, but this product is mainly exported. As Indian diet is very rich in turmeric, the demand for this product (curcumin) by households does not exist.

Global Turmeric Production Scenario

India is the largest producer, consumer and exporter of turmeric in the world. Other major producers are Thailand, other Southeast Asian countries, Central and Latin America and Taiwan. The global production of turmeric is around 11 lakh tonnes per annum. India dominates the world production scenario contributing 78% followed by China (8%), Myanmar (4%) with Nigeria and Bangladesh together contributing to 6% of the global production.

Indian Turmeric Production Scenario

Out of total production of turmeric in India, about 1 percent is sold as fresh and further used for medicinal purposes. Almost 15 percent of the fresh produce is retained as seed by farmers. Around 13 to 15 percent of India's turmeric crop is exported. About 1 percent of the crop is used to manufacture curcumin which is further converted into medicinal uses, nutraceutical and cosmetic uses. About 2 percent of Indian production is used for producing oil and oleoresins. However, manufacturers of these products normally source their produce from other countries such as Indonesia and Vietnam where the rates are more competitive and the curcumin content is higher. Finally, 66 percent of the Indian turmeric is converted into powder which is used for culinary purposes and also mixed with other spices and products.

Among Indian states, Maharashtra has overtaken Telangana as the largest producer of turmeric during the 2021-22 season. However it seems Maharashtra may not be able to sustain the leading position since the relatively low turmeric prices realized by farmers in Maharashtra might induce the farmers to shift to other crops and Telangana may be able to retain its leading position. Karnataka, Tamil Nadu and Andhra Pradesh also figure among the top 5 states for production of turmeric in India.

Odisha and Kandhamal Turmeric Production Scenario

Odisha is usually the 6th largest production state for turmeric in India. The two districts in South-West Odisha namely Kandhamal and Koraput contribute more than 70% of the total production of turmeric in Odisha. The district of Kandhamal itself contributes more than 60% of the turmeric production of the state. Within Kandhamal, the major blocks producing turmeric are Daringbadi, Raikia and Phiringia. Turmeric in Kandhamal is cultivated on slopes, from sea level to 1500m above MSL under rainfed condition with or without terracing as well as in plain, in open and under shade of mango (*Mangifera indica* Linn), and other forest tree like sal (*Shorea robusta*).

Turmeric is often referred to as ATM (any time money) for the tribal growers in Kandhamal as they can sell small amounts of their produce whenever they need money. The vast majority of tribal growers in Kandhamal do not use hybrid seeds for their turmeric crops. The seed rhizomes are stored for 3-4 months from harvesting to planting by spreading them thinly under a cover of turmeric leaves.

The local turmeric cultivars (Kandhamal local variety which has secured GI tag) lacks high curcumin content (2-3%) but has 12.15% of oleoresin and 5.33% of essential oil. Lakadong, Rajendra Sonia, Suroma are other varieties of turmeric grown by farmers in Kandhamal.

Small and marginal farmers generally use their own seed or collected ones from fellow villagers. These farmers shared their experience that when they had used hybrid seeds for cultivation, it lost its quality and behaved like the local variety after repetition of seeds from the 2nd year onwards. Hence, seed replacement is negligible in the area.

Sowing of turmeric in Kandhamal is done in May/June. About 21 days to 1 month after germination, the farmers invest 8-10 person-days for cleaning the grass and mulching sticks. However, virtually all the farmers do not apply any fertilizer, pesticide, compost and irrigation to their turmeric crop and hence claim their crop to be organic (by default).

Harvesting starts from January end to March after the plant turns yellow or dry. Another 25-30 person-days are invested for digging the produce with spade and handpicking the rhizomes. The rhizomes are then, cleaned by removing the roots and sticking soil.

Fingers are separated from the mother rhizomes, which are usually kept as seed material. The freshly harvested rhizomes are stored under shade for 2-3 days. They boil the produce by dipping them in water in an aluminium container for 1 hour. When the green turmeric is properly boiled, the rhizomes would be soft. Then they are taken out for drying under the sun for 10-15 days till they make a metallic sound when hit against a metallic surface. During drying, rhizomes are polished by rubbing them against a hard floor. Hand polishing continues for 5 days for removing the shell from the turmeric and turning the rhizomes into proper shape and size. About 5%-10% of quantity of dried fingers is lost during the mechanical polishing process of turmeric. The dried, polished turmeric is stored in gunny bags in a dry place. The produce with maximum moisture of 10-12% is taken as dry turmeric.

Value Chain Analysis of Kandhamal Turmeric

The analysis of turmeric value chains in Kandhamal has brought out the following key observations which are relevant for development of business plans revolving around turmeric.

1. Buyers of dried and cured turmeric typically choose based on its attributes such as colour, finger sizes, polish, curcumin content, essential oil content, pesticide residues viewed in conjunction with prices.
2. Most manufacturers of turmeric powder for culinary purposes prefer turmeric with lemony yellow colour which is generally supplied from Nizamabad, Kadapa and Salem / Erode. Higher level of polish (double polish) is preferred for turmeric sold in domestic wholesale markets where physical appearance becomes a major consideration for buyers.
3. The colour of turmeric powder manufactured from Kandhamal turmeric fingers typically tends towards a darker shade of golden yellow. This colour is more acceptable in Odisha and nearby regions but finds less favour in other regions of India where the lemony colour is more preferred.
4. Erode has become the leading hub of turmeric required for culinary use. Most manufacturers of turmeric powder prefer to procure turmeric from markets in Erode, Nizamabad and Sangli.
5. The turmeric from North-Eastern states of India (esp. Meghalaya) has gained visibility in recent times because of its double advantages of high curcumin content and 'default organic' character since cultivation in North-Eastern states is typically done without use of synthetic chemicals. However, the relatively higher prices of turmeric in North-Eastern regions, aggregation and logistic challenges, and the additional cost of transportation to extraction units in South India have tilted balance in favour of imported turmeric from Vietnam, Indonesia etc. for production of oleoresins, essential oils and curcumin.
6. Among other production areas, Sangli district of Maharashtra is recognised for its turmeric supposedly known to have great medicinal properties. Sangli turmeric has an earthy, slightly bitter, a little hot peppery flavour and a mustardy fragrance. The deep saffron coloured turmeric of Sangli received the Geographical Indication (GI) tag in 2018.
7. The native 'Kandhamal local' variety continues to be preferred by turmeric growers though some growers in Kandhamal cultivate Lakadong variety and other improved varieties of turmeric for seed purposes. The traditional cultivation practices of turmeric growers in Kandhamal ensure that the turmeric produce does not have pesticide residues. The low level of pesticide residue levels in Kandhamal turmeric along with the added advantages of GI tag and its relatively lower prices make it a relevant proposition for European markets.
8. Nonetheless, it becomes important to develop competitiveness of local turmeric producers and their FPOs so that the turmeric ecosystem in Kandhamal is able to take advantage of the opportunities not only in international markets but also in the domestic markets by tapping benefits of increased demand for sustainably grown and distinctive (GI-tagged) products. For this, the efforts for exports of Kandhamal turmeric to European markets have to be complemented by suitable initiatives to address the intrinsic limitations in native 'Kandhamal local' variety of turmeric. This could be ensured through diversification in turmeric varieties and adoption of improved post-harvest management (including storage, value addition and processing) which builds on the current processing facilities available with KASAM – the catalyst and driver of turmeric value chain development in Kandhamal.

Gaps and Challenges in Value Chains of Turmeric in Kandhamal

From an economic development perspective, there are four main issues in the turmeric value chain needing higher degree of attention. These issues pertain to: (i) traditional v/s recommended practices during production and post-harvest management; (ii) persistent low levels of post-harvest management and value addition by producers; (iii) limited equity or bargaining power of producer organisations in value chains; (iv) social and occupational conditions esp. with regards to women, children and youth participation

Potential Interventions for Kandhamal Turmeric to Access EU Markets

I. Infrastructure Support

A. Provision of Critical Infrastructure for Post-Harvest Management and Stocking of Turmeric

A1. Harvester, Boiling Units, Mechanical / Solar Driers and Drying Yards for Turmeric

A2. Cold Storage for Dried Turmeric in Kandhamal (preferably close to the processing unit of KASAM)

II. Institutional Development

B. Promoting institutional structures for effective governance of turmeric value chain development programme in Kandhamal

C. Addressing market failures and gaps in service delivery to turmeric growers and producer organisations

D. Facilitating access to markets, finance and risk mitigation services

Proposed Export Oriented Value Chain for Turmeric in Kandhamal

The AMD project envisions connecting producer organisations (FPOs) in Kandhamal directly with the markets in EU for various turmeric products. The intended objective of the project could be viewed as a multi-stage or multi-level initiative which has to systematically build the capacities of selected FPOs for catering to the demands or opportunities of more challenging buyers which would in turn enable these FPOs to realize more remunerative prices for turmeric products supplied by them. It becomes important to recognise here that the goal of supplying turmeric products to a challenging buyer (oleoresin manufacturer) or market (EU or Japan) could be relatively simpler than the goal of developing or nurturing the selected FPOs to become an influential actor in the value chains of turmeric products which serve remunerative markets such as EU. By enabling the FPO to become an influential or dominant actor in some of the targeted value chains will ensure long-term benefits not only for the associated turmeric producers but also for the underlying ecosystem for turmeric in Kandhamal. In pursuit of this goal, the focus should therefore be on building the organisational (or entrepreneurial) capacities of the selected FPO(s) especially for achieving critical scale, profitability and sophistication in its business operations especially on the postharvest and marketing side. Till the time the selected FPO reaches the critical scale, profitability and sophistication, it would be useful for it to be nurtured or supported by a private sector partner (primarily for business development support services for product distribution, market outreach, financing mobilization, stakeholder management, systems development etc.

1. Commodity Profile – Turmeric

Turmeric (*Curcuma longa* L), the ancient and sacred spice of India is known as 'Indian saffron'. It serves as an important commercial spice crop grown in India. It is used in diversified forms as a spice, flavouring and colouring agent and as a principal ingredient in Indian culinary as curry powder. The curcumin in turmeric carries molecules credited with antiinflammatory, hypocholesteremic, antimicrobial, antirheumatic, antifibrotic, antivenomous, antiviral, antidiabetic, antihepatotoxic and anti-cancerous properties as well as insect repellent activity (Chattopadhyaya et al, 2004) which find use in the drug industry and cosmetic industry. A type of starch is also being extracted from a particular type of turmeric. The increasing demand for natural products as food additives makes turmeric an ideal produce as a food colour. Turmeric is the dried rhizome of *Curcuma longa* L., a herbaceous perennial belonging to the family Zingiberaceae and a native of South Asia particularly India.

1.1 Market Overview

Turmeric is being used as a spice crop from a very early period of recorded history because of its colouring, flavouring and medicinal properties. Out of total production of turmeric, about 1 percent is sold as fresh and further used for medicinal purposes. Trade for the rest of the produce is mostly in dry form. About 1 percent of the crop is used to manufacture curcumin which is further converted into medicinal uses, nutraceutical and cosmetic uses. About 2 percent of production is used for producing oil and oleoresins because it appears that manufacturers of these products normally source their produce from other countries such as Indonesia and Vietnam where the rates are more competitive and the curcumin content is higher.

The seed rate for turmeric is about 2000 to 2500 kgs per hectare and about 15 percent of the fresh produce is retained as seed by farmers. India is also one of the biggest exporters of turmeric and about 13 to 15 percent of the crop is exported. The exports are in different forms, such as fresh, dry, powder, oil and oleoresins. Finally, 66 percent of the produce is converted into powder which is used for culinary purposes and also mixed with other spices and products.

Dried turmeric rhizomes yield about 5 to 6 percent volatile oil and about 10 percent oleoresin which is mainly used for pharmaceutical purposes. Turmeric oleoresin is in great demand in the global food and pharmaceutical sector as it contributes to the aroma of turmeric and contains the flavour compounds and colour in the same proportion as is present in turmeric. It was reported that barely 2 percent of turmeric production may be utilized for extraction of turmeric oil and oleoresins.

Curcumin is the main biologically active phytochemical compound of turmeric. It is one of the three curcuminoids of turmeric and is extracted, concentrated and standardized for usage in several products. Curcumin gives yellow colour to turmeric and has a wide range of medicinal properties. It

is a water soluble, orange-yellow coloured powder. There are few players involved in manufacturing of curcumin.

The production of curcumin in India was estimated to be 500 tonnes. The global curcumin market share indicates the following uses:

- Pharmaceutical: 58 %
- Food : 37%
- Cosmetic : 4%
- Other : 1%

The usage of curcumin in various products is gaining increasing importance, but this product is mainly exported. As Indian diet is very rich in turmeric, the demand for this product by households does not exist. The price of the product ranges between Rs 7000 to Rs 8000/kg.

1.1.1 Global Production of Turmeric

India is the largest producer, consumer and exporter of turmeric in the world. Other major producers are Thailand, other Southeast Asian countries, Central and Latin America and Taiwan. The global production of turmeric is around 11 lakh tonnes per annum. India dominates the world production scenario contributing 78% followed by China (8%), Myanmar (4%) with Nigeria and Bangladesh together contributing to 6% of the global production.

1.1.2 Indian Production of Turmeric

During the 2021-22 season, Maharashtra has overtaken Telangana as the largest producer of turmeric in India. However it seems Maharashtra may not be able to sustain the leading position since the relatively low turmeric prices realized by farmers in Maharashtra might induce the farmers to shift to other crops.

PRODUCTION (IN MT)	2017-18	2018-19	2019-20	2020-21	2021-22
Maharashtra	38590	38310	218873	230741	367985
Telangana	294560	345270	386596	319760	330257
Karnataka	122760	153770	132668	131138	130970
Tamil Nadu	73130	92360	96254	86513	104402
Andhra Pradesh	79730	69410	71321	73244	74687
Madhya Pradesh	41290	47660	57067	62995	69886
Odisha	43610	43615	43615	43615	68826

Source: indianspices.com (Spice Board of India)

The major production centres and markets of turmeric across India are listed in the following table.

State	Major Production Centres and Markets of Turmeric
Kerala	Cochin, Allepey, Kollam
Telangana	Nizamabad, Jagtial (erst. Karimnagar), Nirmal, Warangal
Karnataka	Chamarajanagar, Belgaum, Bagalkot, Mysore
Tamil Nadu	Erode, Salem, Coimbatore, Dharmapuri
Maharashtra	Sangli, Hingoli, Parbhani, Nanded, Satara, Waigaon (Wardha)
Andhra Pradesh	Vizianagaram, Visakhapatnam, Duggirala (Guntur), Kadappa (YSR district)
Odisha	Koraput, Kandhamal, Bhubaneswar, Cuttack
Madhya Pradesh	Rewa, Sagar, Dhar, Tikamgarh, Katni, Jabalpur, Burhanpur, Alirajpur
Gujarat	Navsari, Dahod, Panchmahal, Surat, Mahisagar, Anand

1.1.3 Turmeric Export Scenario

Turmeric Export Statistics

Year	Export Qty in MT	Export Value in INR Lakh	Top 6 Export Destinations	Share of Top 6 Markets (by Value)
2021-22 (Est.)	153154.5	178434	USA, Bangladesh, UAE, Malaysia, Morocco, Germany	56.7%
2020-21	183868.2	172265	USA, Bangladesh, UAE, Iran, Malaysia, UK	56.8%
2019-20	137650	128691	Bangladesh, USA, Iran, UAE, Malaysia, Morocco	48.8%
2018-19	133600	141616	Iran, USA, Bangladesh, Morocco, UAE, Malaysia	48.1%
2017-18	107300	103568	USA, Iran, UAE, Malaysia, Morocco, UK	42.4%

1.2 Turmeric Production in Odisha

As per data from the Spice Board of India, Odisha is usually the 6th largest production state for turmeric in India. The two districts in South-West Odisha namely Kandhamal and Koraput contribute more than 70% of the total production of turmeric in Odisha. The district of Kandhamal itself contributes more than 60% of the turmeric production of the state. Other important districts for turmeric production in Odisha are Nayagarh and Keonjhar which cumulatively contribute about 9% of the total turmeric production of Odisha.

1.2.1 Turmeric Production Region (Kandhamal)

Kandhamal is the leading district for production of turmeric in Odisha state. It contributes more than 60% of the total turmeric production of Odisha. Within Kandhamal, the major blocks producing turmeric are Daringbadi, Raikia and Phiringia.

It has sub-tropical climate characterized by hot and dry summer, medium to high rainfall and prolonged cold and dry winter. The soil is mostly red-laterite and sandy loamy, which is porous and

low water holding capacity. The pH value of the soil varies between 5.3 and 6.5, which indicates that the soil is acidic in nature.

Turmeric is cultivated on slopes, from sea level to 1500m above MSL under rainfed condition with or without terracing as well as in plain, in open and under shade of mango (*Mangifera indica* Linn), and other forest tree like sal (*Shorea robusta*).

Turmeric is often referred to as ATM (any time money) for the tribal growers in Kandhamal as they can sell small amounts of their produce whenever they need money. The vast majority of tribal growers in Kandhamal do not use hybrid seeds for their turmeric crops.

The seed rhizomes are stored for 3-4 months from harvesting to planting by spreading them thinly under a cover of turmeric leaves. For storage seed rhizomes are also stored by heaping them under the shade of trees. Heaps are covered with turmeric leaf and plastered with soil and cow dung mixture. Farmers stored turmeric in the field and also in backyard under the shade of mango (*Mangifera indica* Linn), jackfruit (*Artocarpus heterophyllus* Lam.) since these trees protect rhizomes from heat and rains and also create micro environment to enhance the shelf life and reduce the losses.

Small and marginal farmers generally use their own seed or collected ones from fellow villagers. These farmers shared their experience that when they had used hybrid seeds for cultivation, it lost its quality and behaved like the local variety after repetition of seeds from the 2nd year onwards. Hence, seed replacement is negligible in the area.

Large farmers use their own seeds and buy additional requirement of seed rhizomes from public and private nurseries. Such farmers use only healthy, nematode free rhizomes to avoid nematode problem in turmeric.

1.2.2 Turmeric Varieties and Key Characteristics

The local turmeric cultivars (Kandhamal local variety which has secured GI tag) lacks high curcumin content (2-3%) but has 12.15% of oleoresin and 5.33% of essential oil.

Lakadong, Rajendra Sonia, Suroma are other varieties of turmeric grown by farmers in Kandhamal.

Research efforts in Odisha (at High Altitude Research Station in Semiliguda block of Koraput) have resulted in the evolution of 3 high yielding varieties with good bright colour and high curcumin

content (6.7%) viz Reshmi, Roma, Suroma. The salient features of these high-yielding turmeric varieties grown are described below .

- Roma: Suitable for both rainfed and irrigated condition, suitable for hilly areas and late season planting. Curcumin content 6.1%, oleoresin 13.2%, essential oil 4.2%, dry recovery 31.0% and crop duration 250 days with average yield 20.7 MT/ha.
- Suroma: Round and plumpy rhizome, field tolerance to leaf blotch, leaf spot and rhizome scale, curcumin content 6.1%, oleoresin 13.1%, essential oil 4.2%, dry recovery 31.0 % and crop duration 250 days. Yield was recorded 20 MT/ ha.
- Reshmi: Bold rhizomes, suitable for both rainfed and irrigated condition, early and late sown season, curcumin content 6.4%, oleoresin 13.4%, essential oil 4.4%, dry recovery 23.0% and crop duration 240 days. Average yield (fresh) at farmers field were recorded 31.5 MT/ha.

Traders prefer bold fingers usually of 3 inches or more length along with colour / lustre, moisture content and weight of the individual bulb/finger irrespective of the variety. This indifference towards varieties is due to absence of standardization norms in key turmeric markets and associated arrivals of mixed variety turmeric stocks. Traders are willing to purchase turmeric with high curcumin content, depending on the demand in terminal markets, provided grading and quality parameters are standardised and maintained at farmers' end.

1.2.3 Turmeric Crop Seasonality

Calendar of Key Activities

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Harvest of Turmeric			Land Preparation	Sowing / Planting		Turmeric Crop Growth and Development					

As the duration of the crop is 8-9 months, the farmer start collecting sal branches in March month for mulching the crop. Thereafter, land preparation is done in Apr-May by deep ploughing of the land by bullocks / tractors for about 4-5 times. Sowing of turmeric is done in May/June. About 21 days to 1 month after germination, the farmers invest 8-10 person-days for cleaning the grass and mulching sticks. However, virtually all the farmers do not apply any fertilizer, pesticide, compost and irrigation to their turmeric crop and hence claim their crop to be organic (by default).

Harvesting starts from January end to March after the plant turns yellow or dry. Another 25-30 person-days are invested for digging the produce with spade and handpicking the rhizomes. The rhizomes are then, cleaned by removing the roots and sticking soil.

Fingers are separated from the mother rhizomes, which are usually kept as seed material. The freshly harvested rhizomes are stored under shade for 2-3 days. They boil the produce by dipping them in water in an aluminium container for 1 hour. When the green turmeric is properly boiled, the rhizomes would be soft. Then they are taken out for drying under the sun for 10-15 days till they make a metallic sound when hit against a metallic surface. During drying, rhizomes are polished by rubbing them against a hard floor. Hand polishing continues for 5 days for removing the shell from the turmeric and turning the rhizomes into proper shape and size. About 5%-10% of quantity of dried fingers is lost during the mechanical polishing process of turmeric. The dried, polished

turmeric is stored in gunny bags in a dry place. The produce with maximum moisture of 10-12% is taken as dry turmeric.

1.3 Value Chain Analysis

Unlike ginger which has a wide range of uses, turmeric is a commodity which does not lend itself to a wide variety of uses especially for the end-consumer. The high majority of consumers in India use only a minuscule quantity of turmeric in their daily cooking. Furthermore, the market for curcumin – the most sought after ingredient in turmeric, is quite niche and is of a relatively small size. This implies that there is an extremely limited number of alternatives or applications which could help in increasing the consumption or the demand of turmeric. Unlike fruits or nuts or seeds, it is quite difficult to increase the daily intake of turmeric at a household or per capital basis or to increase its penetration among Indian households since the spice is already used in virtually all the households. The typical character of its consumption pattern limits the upside for turmeric in the commodity form but there are options to improve its price realisation through branding, certification, nutritional promotion (as witnessed during Covid-19 or in case of almonds or walnuts), usage in nutraceuticals or specialised medicinal applications etc.

In India, there are commodity derivatives (futures) for turmeric which can provide a view of the future demand and supply. The prices in futures market could serve as a guide to the farmer to make the decision on allocation of area to the crop. Furthermore, the futures can enable the farmers to hedge their prices on the commodity exchange. The major challenges for smallholder farmers in accessing futures market for price hedging are minimum lot size (trading quantity thresholds) and the requirement of paying margins based on price fluctuations. Furthermore, the vast majority of farmers in turmeric are likely to have a limited knowledge of how to avail the benefits of futures while safeguarding them from large downsides. Smallholder farmers can benefit from futures trading only if their producer organizations can participate in the market on their behalf. The farmers should be trained on the benefits of futures markets as the prices in these markets will be more useful in deciding their cropping pattern, as compared to resorting to the previous year's price as a guiding force.

Key Observations from Value Chain Analysis of Kandhamal Turmeric

The analysis of turmeric value chains in Kandhamal has brought out the following key observations which are relevant for development of business plans revolving around turmeric.

1. Buyers of dried and cured turmeric typically choose based on its attributes such as colour, finger sizes, polish, curcumin content, essential oil content, pesticide residues viewed in conjunction with prices.
2. Most manufacturers of turmeric powder for culinary purposes prefer turmeric with lemony yellow colour which is generally supplied from Nizamabad, Kadapa and Salem / Erode. Higher level of polish (double polish) is preferred for turmeric sold in domestic wholesale markets where physical appearance becomes a major consideration for buyers.
3. The colour of turmeric powder manufactured from Kandhamal turmeric fingers typically tends towards a darker shade of golden yellow. This colour is more acceptable in Odisha and nearby

regions but might find less favour in other regions of India where the lemony colour is more preferred.

4. Erode has become the leading hub of turmeric required for culinary use. Most manufacturers of turmeric powder prefer to procure turmeric from wholesale markets of Erode, Nizamabad or Sangli.
5. The turmeric from North-Eastern states of India (esp. Meghalaya) has gained visibility in recent times because of its double advantages of high curcumin content and 'default organic' character since cultivation in North-Eastern states is typically done without use of synthetic chemicals. However, the relatively higher prices of turmeric in North-Eastern regions, aggregation and logistic challenges and the additional cost of transportation to extraction units in South India have tilted balance in favour of imported turmeric from South East origins (Vietnam / Indonesia) for production of oleoresins, essential oils and curcumin.
6. Among other production areas, Sangli district of Maharashtra is recognised for its turmeric supposedly known to have great medicinal properties. Sangli turmeric has an earthy, slightly bitter, a little hot peppery flavour and a mustardy fragrance. The deep saffron coloured turmeric of Sangli received the Geographical Indication (GI) tag in 2018.
7. The native 'Kandhamal local' variety continues to be preferred by turmeric growers though some growers in Kandhamal cultivate Lakadong variety and other improved varieties of turmeric for seed purposes. The traditional cultivation practices of turmeric growers in Kandhamal ensure that the turmeric produce does not have pesticide residues. The low level of pesticide residue levels in Kandhamal turmeric along with the added advantages of GI tag and its relatively lower prices make it a relevant proposition for European markets.
8. Nonetheless, it becomes important to develop competitiveness of local turmeric producers and their FPOs so that the turmeric ecosystem in Kandhamal is able to take advantage of the opportunities not only in international markets but also in the domestic markets by tapping benefits of increased demand for sustainably grown and distinctive (GI-tagged) products. For this, the efforts for exports of Kandhamal turmeric to European markets have to be complemented by suitable initiatives to address the intrinsic limitations in native 'Kandhamal local' variety of turmeric. This could be ensured through diversification in turmeric varieties and adoption of improved post-harvest management (including storage, value addition and processing) which builds on the current processing facilities available with KASAM – the catalyst and driver of turmeric value chain development in Kandhamal.

The main factors influencing prices are the area sown under turmeric, the demand in both domestic and international markets and also production and prices in global markets. Further, in different states the varieties of turmeric cultivated are different and prices vary according to the variety. The finger and bulb of the turmeric fetch different price. The price largely depends upon the quality of

the produce and if the moisture content is high, then the produce is sold at a price that is lower than ruling market price. Hence prices of turmeric are influenced by several factors.

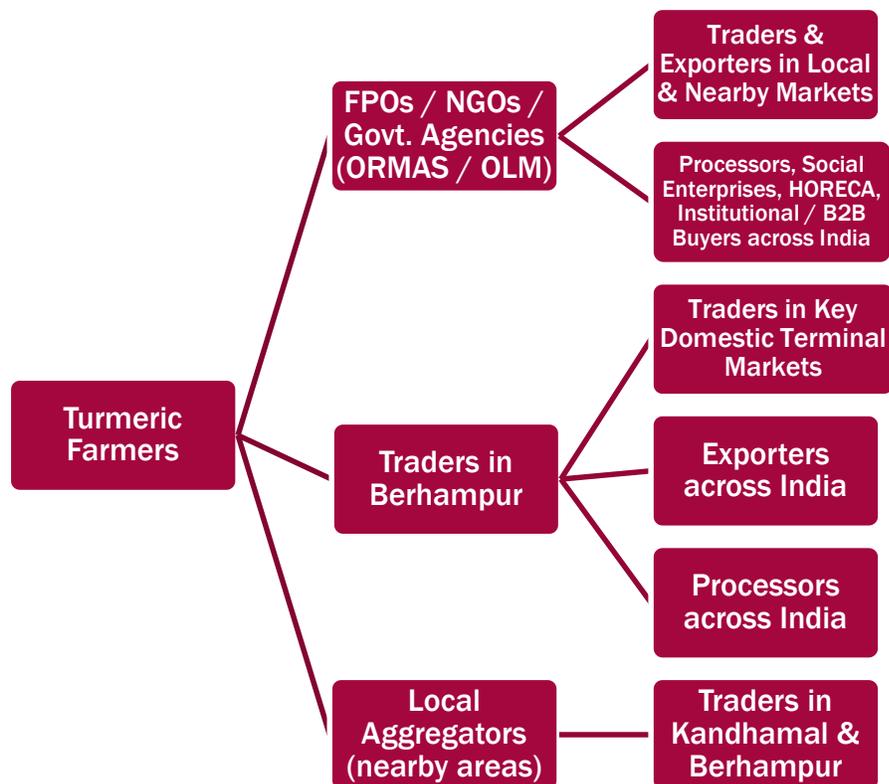
1.3.1 Major Actors in Value Chain

- Major Actors in Value Chain of Turmeric in Kandhamal

Activity	Agent / Actor	Output
Input Supply	Agri-Input Shops, Fellow Farmers	Seeds, Nutrients, Protection Chemicals, Agri-Machinery, FYM, Bio/Organic Inputs
Training and Subsidies	Dept. of Horticulture, KVK, IISR-affiliated Research Stations (RRTTS Semiliguda & HARS Pottangi)	Package of Practices, Frontline Demonstrations, Soil Testing, Subsidies etc.
Crop Production	Farmers	Turmeric produce
Post-Harvest Management	Farmers, FPOs, NGOs, KASAM, Govt. Agencies (ORMAS / OLM)	Cleaning, Boiling, Curing, Drying
Transportation	Local Aggregators, Agents FPOs, NGOs	Logistic Assistance, Packing, Quality Assessment
Primary Processing	Local Aggregators, Agents, FPOs, NGOs, KASAM, Govt. Agencies (ORMAS / OLM)	Boiling, Curing, Drying, Polishing, Cold Storage etc. for dried turmeric fingers
Secondary and Tertiary Processing	Specialized Processing Units for Turmeric Oil, Oleoresins and other Complex Products	
Distribution and Retail (Domestic Market)	Traders, FPOs and NGOs in Kandhamal, Berhampur, Bhubaneswar, Chennai, Kochi, Visakhapatnam, Raipur etc.	Marketing and sales of dried turmeric fingers in domestic and neighboring export markets
Exports	Specialized Processors mainly in South India; Exporters in Kerala, Tamil Nadu etc.	Marketing of complex products made from dried turmeric in distant markets
Certifications -Phytosanitary Certification, GLOBAL GAP, Health Certificate)	SGS, Eurofins, TuV etc.	Certified consignments of turmeric products for domestic / export markets
Organic certification	APEDA approved Certification agencies including Orissa State Organic Certification Agency for NPOP; USDA approved Certification agencies for NOP	NPOP / NOP certified organic turmeric products for domestic / export markets

1.3.2 Commodity Flow Analysis

Trade Channels for Kandhamal Turmeric



Indian Exports and Imports of Turmeric

Out of total exports of turmeric, the share of dry turmeric was highest in quantity and value terms. In quantity terms, the share ranged between 44.38 percent in 2016-17 to 59.84 in 2019-20 while in value terms, the share ranged from 24.67 percent in 2018-19 to 31.51 percent in 2019-20. Turmeric powder was also an important item of export and the share in quantity ranged from 30.27 percent in 2019-20 to 37.47 percent in 2015-16.

The quantity of turmeric oil exported showed a decline over the period 2015-16 to 2019-20. While the quantity exported was as high as 84.56 MT in 2016-17, it declined sharply to 27.41 MT, thus showing a negative growth rate of 9.30 percent per annum.

Turmeric oleoresin however showed a steady increase in exports and the quantity exported increased from 814.68 MT in 2015-16 to 2090.53 MT in 2019-20.

India is a major exporter of dry turmeric and several countries import the product from India. The highest exports of dry turmeric are to Iran and from 2013-14 to 2019-20, the average share of exports to Iran is 20.7 percent. While UAE also had a considerable share in imports of turmeric powder till 2011-12 when one-fourth of the exports were sent to UAE, the share has declined over the years and was as low as 3.97 percent in 2015-16 with slight recovery in the following years.

Bangladesh, Malaysia and Sri Lanka also import dry turmeric from India. The highest share of exports of turmeric powder is to USA which was 15.33 percent in 2019-20. UAE also has a relatively high share in imports and in 2012-13 the share in imports was 14.94 percent. European countries such as UK, Netherlands and Germany also import turmeric powder. In fact turmeric powder is imported by large number of countries in the world.

The main importer of turmeric oleoresin is USA and from 2007-08 to 2019-20, the share of USA in imports of turmeric oleoresin approximately ranged from 40 percent to 58 percent. Besides, USA, a large number of European countries import turmeric oleoresin. European countries prefer to import value added products such as oleoresins as they are more convenient to use, more hygienic with less scope for contamination and can be more easily transported.

Although India is the dominant producer of turmeric in the world, the product is still imported. The quantity that was imported in 2015-16 was 15922 MT and this figure increased to 28613 tonnes in 2019-20 registering a growth rate of 15.78 percent. Other countries are able to export at competitive rates and are not major consumers of their domestic production. India therefore imports turmeric and it is mainly for the requirement of those processors who produce value added products such as essential oils and oleoresins.

There are several reasons why India still imports turmeric from other countries despite being a major producer of turmeric. An important factor that is responsible for imports is the price differential. Discussion with an agritech start-up which supplies mainly to processors and extraction units reveal that the price in the domestic market are higher than in the international markets and hence processors find it cheaper to import the produce. Secondly, in India, there are a few varieties such as Alleppey and Lakadong which have high curcumin content. The demand from extraction units of essential oils and oleoresins is mainly of varieties which have high curcumin content. Lakadong variety is grown in North Eastern part of India and its transport to extraction units has inherent problems which makes imports more convenient. Finally the production of turmeric also depends upon climatic conditions and is subject to fluctuations which can have an impact on prices. Hence price volatility in domestic markets can also induce imports of the product. While Ethiopia and Myanmar were the main countries from which India was importing turmeric from 2015-16 to 2017-18, in the recent years, imports are mainly from Vietnam.

1.4 Farm-Level Economics of Turmeric Cultivation

The major components of the cultivation costs for turmeric are the cost of seeds, plant protection chemicals, fertilizers and most importantly, the labours involved in farm operations such as bed preparation, seed sowing, weeding / cleaning and harvesting. Labour costs clearly comprise the largest share (45%-60%) of the cultivation costs of turmeric. Most smallholder, tribal farming households in Kandhamal cultivate turmeric in 1 acre to 2 acres. Based on a closer analysis of the

economics of turmeric cultivation, it appears that most turmeric farmer households would be managing their cultivation with the help of intra-household labour provided by family members.

It is important to note here that the turmeric in Kandhamal still continues to be cultivated without the use of chemical fertilizers and protection chemicals. Though the turmeric is reported to be of organic character by default, only a limited area is under coverage of third-party organic certification.

The cost of production of turmeric as observed in Kandhamal is as follows:

Key Activities	Time Required (Person Days)	Nature	Cost (in INR)
Stage 1: Production of Fresh Turmeric			
Land Preparation – 6 times		Critical	6000
Organic Manure		Desirable	4500
Bed Preparation	20 person days	Important	3000
Seeds Arrangement – 8 Quintals (Seed is replaced every 3-5 years)		Desirable	24000
Seed Sowing	15 person days	Critical	3000
Mulching (Leaf, Paddy Straw)		Desirable	1500
Irrigation (Rain-fed)			
Weeding / Cleaning	16 person days	Critical	4000
Sprays (bio-pesticides) (Material + Application)		Important	3000
Harvesting (Digging, Cleaning)	30 person days	Critical	8000
Stage 2: Conversion of Fresh Turmeric to Dried Turmeric			
Boiling		Critical	2400
Firewood for boiling		Critical	0
Drying		Critical	0
Total Cost of Cultivation (Dried Turmeric)	Critical + Important + Desirable		59,400
Cost of Cultivation (Dried Turmeric)	Critical + Important		26,400

1.4.1 Price Build-up Analysis: Production, Marketing Functions, and Key Supply Chain Activities

Production Cost (per acre) ~ INR 26,400 per Kg (for smallholder, tribal households)

Yield (per acre) ~ 4000 Kg

Particulars	Amount (in INR per Kg)	Price Markup (INR per Kg)
Production Cost (Dried)	33	
Dried Turmeric Sale Price (Estimated Average)	46	
Average Selling Price for Farmers	55	
Farmgate-level Handling Costs (Cleaning, Packaging, Loading & Transportation)	3.2	58.2
Aggregator / Local Middlemen Charges	1.5	59.7
Handling & Transaction Costs in Nearby Market / RMC (Loading, Unloading, Quality Sampling, Market Fee)	1.5	61.2
Local Trader's Margin (6-8%)	3.5	64.7
Transport to Nearby Terminal Market (Bhubaneswar / Visakhapatnam)	1.25	65.95
Cost of Wastage / Dump (2.5%)	1.25	67.4

(At wholesaler's level)		
Wholesaler's Margin (7-8%)	5.0	72.4
Cost of Wastage / Dump (7.5%)	5.85	78.25
(At retailer's level)		
Retailer's Margin (25-30%)	21.55	99.8

1.5 Gaps and Challenges in the Value Chain

From an economic development perspective, there are four main issues in the turmeric value chain needing higher degree of attention. These issues pertain to: (i) traditional v/s recommended practices during production and post-harvest management; (ii) persistent low levels of post-harvest management and value addition by producers; (iii) limited equity or bargaining power of producer organisations in value chains; (iv) social and occupational conditions esp. with regards to women, children and youth participation

(i) Traditional v/s recommended (scientific) production practices

Smallholders have limited or no access or no access to improved inputs (quality/disease-free planting material, seed treatment materials and manure/compost). Production of turmeric by smallholder, tribal farmers in Kandhamal suffers from low yields.

Since turmeric rhizomes can be stored for use as seeds in the next planting season, most producers use stored seeds for a minimum of three years. It is startling to note that though the research station in Koraput (affiliated with the Indian Institute of Spices Research) has developed a number of high-yielding varieties of turmeric, the vast majority of local smallholder, turmeric farmers still cultivate the Kandhamal local turmeric variety which is also bestowed with the GI tag. Likewise, very few tribal and smallholder growers follow the practice of seed treatment which could help reduce the losses due to soil-borne diseases. This becomes important when most grower use stored seeds for turmeric cultivation.

There is thus a clear gap between the technical / research institutions and the local growers (along with their support organisations) which could help the latter in maintaining the right balance between traditional and recommended practices in turmeric production and postharvest management.

(ii) Challenges in post-harvest management and suitable storage by producers

The process of boiling, curing and drying turmeric after harvest is becoming increasingly cumbersome for the individual growers with reduced availability of intra-household labour to assist in these processes. The high level of drudgery and painstaking effort required in turmeric in leading to disillusionment among growers especially as the prices of dried turmeric have been quite unattractive in the last 2-3 years.

Furthermore, tribal and smallholder growers of turmeric in Kandhamal sell most of their turmeric produce immediately after harvest. It is believed that storage of turmeric at household level in ambient conditions especially during the monsoon months leads to loss of colour and physical appearance. While storage in cold storage could enable the growers to sell their produce at a later

time or to supply it in powder form round the year, the current lack of cold storages and required aggregation arrangements deter turmeric growers in stocking their produce.

- (iii) Challenges faced by KASAM in expanding exports of turmeric produce of Kandhamal especially during / after Covid-19 pandemic

The turmeric ecosystem in Kandhamal is blessed with the presence of KASAM (Kandhamal Apex Spices Association for Marketing) which had been the flagbearer for export of turmeric of local turmeric to international markets including the EU markets. To stabilize the prices in local turmeric markets, KASAM offers its member-farmers a minimum assured price which is usually way higher than the prevailing market price for dried turmeric. However, the challenges in expanding exports of turmeric products from Kandhamal especially during Covid-19 pandemic has adversely impacted the ability of KASAM to purchase dried turmeric at the declared minimum assured price from a high proportion of its member-farmers.

- (iv) Social and occupational conditions (esp. with regards to participation of women, children and youth)

Women play an instrumental role in the turmeric crop of Kandhamal. Though the women have limited decision making or decision influencing powers in matters related to land preparation, agri-inputs, financing, marketing and hiring of paid labour, they contribute bulk of the household labour required during planting, weeding and harvest operations. The children (including the school-going ones) from tribal, smallholder households that cultivate turmeric also contribute labour for key operations in turmeric production.

Occupational Conditions: The cultivation and processing of turmeric in Kandhamal continues to be done largely with hand tools and using manual approaches. Most of the operations especially during the post-harvest stages of turmeric especially transit storage, transportation, boiling, drying etc. are done in unhygienic or unsanitary conditions which could compromise food safety.

1.6 Potential Interventions to Access EU Markets

1.6.1 EU market requirements

Requirements for turmeric for the European market can be broken down in two broad categories:

- a. Food safety requirements (traceability, hygiene and control): HACCP are obligatory. There are some optional requirements demanded by specific European buyers. In addition, turmeric has to meet EU standards on maximum levels of contamination (mycotoxins, salmonella etc.), pesticide residue levels (MRLs), detergent residue, additives, fumigants etc.
- b. Non-obligatory requirements: demanded by specific buyers, such as BRC, Rainforest Alliance, organic and fair-trade certification.

Role of Certifications

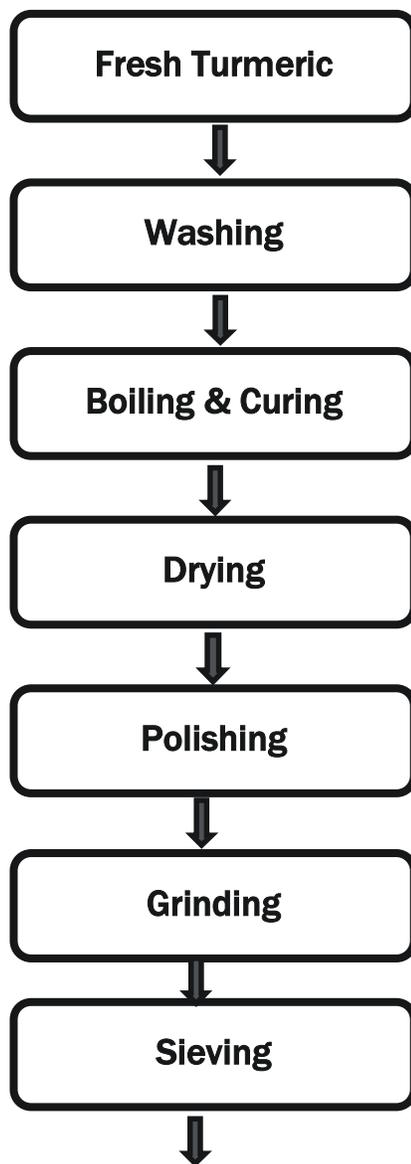
According to the CBI EU market study on turmeric and other spices, certification can provide SMEs with a competitive edge, validating their compliance with CSR standards and dealing with

sustainability issues. This is because sustainable sourcing of certified products is a major trend in the EU, with the UK, the Netherlands and Germany leading the way. CBI notes that for dried turmeric, the main certifications are organic and Fairtrade. For organic certified turmeric, the most interesting markets are Germany and Switzerland, since these countries are leading organic food markets in Europe. For Fairtrade-certified turmeric, the most interesting market is the United Kingdom, since it is the number one country for Fairtrade products.

1.6.2 Potential Interventions

The process flow for production of dried turmeric is provided in the following diagram.

Process Flow for Production of Dried Turmeric and Turmeric Powder



Packaging

III. Infrastructure Support

E. Provision of Critical Infrastructure for Post-Harvest Management and Stocking of Turmeric

A1. Harvester, Boiling Units, Mechanical / Solar Driers and Drying Yards for Turmeric

It has been observed that turmeric growers in Kandhamal are getting becoming disinterested in turmeric cultivation due to the drudgery and painstaking effort involved in harvesting, boiling and drying of turmeric. To reduce their pains, it becomes vital to create their access to turmeric harvesters, boiling units, mechanical / solar driers, drying platforms through their producer organisation. Provision of these equipment / infrastructure would also contribute towards better quality control in turmeric especially during the key operations of boiling, curing and drying.

A2. Cold Storage for Dried Turmeric in Kandhamal (preferably close to the processing unit of KASAM)

It is commonly seen that most turmeric growers sell off their dried turmeric produce immediately after processing and thus miss out on opportunities for higher price realisation in the subsequent months. Dried turmeric fingers can be stored for more than a year under suitable conditions in a cold storage. Since KASAM already has a unit for processing turmeric into powder and oil, it would be sensible to locate the cold storage near the turmeric processing unit of KASAM.

IV. Institutional Development

F. Promoting institutional structures for effective governance of turmeric value chain development programme in Kandhamal

The key policy making institutions comprising of agencies from Govt. of India, BMEL and Govt. of Odisha need to promote an 'agribusiness friendly' policy environment to improve incentives for private sector buyers and off-takers which will lead to lower transaction costs for turmeric growers and their producer organisations. This could be achieved by developing institutional structures and mechanisms that favour cooperation and coordination among value chain stakeholders. Towards this goal, the AMD Project could look to support and facilitate an effective Public-Private Dialogue (PPD) mechanism which will seek to (i) facilitate training of main stakeholders on effective use of PPD to continue improving the performance of turmeric value chain; (ii) support increased consultations among the key stakeholders in turmeric value chains; for instance, through regular forums to discuss the various constraints and bottlenecks; (iii) review and update the turmeric value chain development strategy; (iv) develop a shared vision and a harmonized approach to minimize potential conflict and devise mechanisms for coordinating private and public investments; (v) strengthen the

capacity of key organizations overseeing the public and private sector engagement to ensure better services to turmeric growers and their producer organisations; and (vi) advocate for a more enabling business environment with a view to developing inclusive value chains for turmeric which deliver win-win economic outcomes to both producer organisations and the downstream private sector buyers working close to the ultimate consumers.

G. Addressing market failures and gaps in service delivery to turmeric growers and producer organisations

The project should strive to develop a strong base of human capital and entrepreneurial capacity for exploiting economic opportunities in the turmeric value chain through enablement of value addition and other key support services (e.g., food safety, traceability, sanitary and phytosanitary compliance, carrying and forwarding - C&F, insurance) required for integration of turmeric growers with remunerative domestic and export markets. Towards this, the project could look to support the following activities: (i) technical assistance (TA) that enables selected producer organisations to raise the quality of their existing services (if any) and to create new ones in response to the demand of turmeric growers; (ii) a capacity-building program to equip producer organisations and supporting agencies with requisite capacity (technical know-how and business competencies); (iii) promote linkages and partnerships with value chain actors to better meet the needs of producer organisations for domestic and export market access; for instance in terms of certification, traceability, market development advice, and technology transfer; and (iv) access to finance for upgrading/expanding the scope of services provided by producer organisations to turmeric growers. It is expected that this service provision approach will engage local entrepreneurs (youth, both women and men) as service providers to create a catalytic effect in accelerating the agribusiness opportunities in Kandhamal especially vis-à-vis the turmeric value chain opportunities. The project could look to support these service providers to expand outreach and address financial and non-financial barriers through design of appropriate incentive structures such as performance-based incentive, market-making incentive and facilitation support for market development.

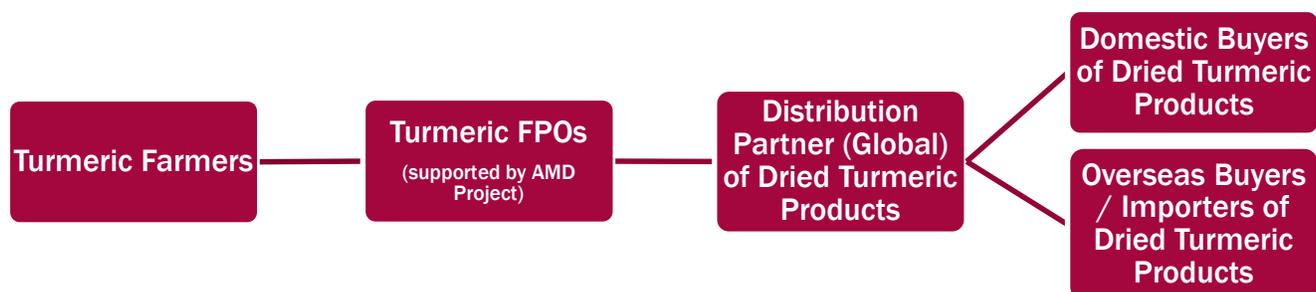
H. Facilitating access to markets, finance and risk mitigation services

To facilitate access to markets for producer organisations, the project could facilitate suitable partnerships with the market facing players besides promoting a range of approaches including contract farming, forward contracts, linkages with integrators and other market channels viz. modern retail, responsible supply chains, organized national markets, e-markets, and exporters. Along with these partnerships and market development approaches, the project could look to strengthen support infrastructure and systems for Sanitary and Phyto Sanitary (SPS), traceability, and standards-certification. Towards improved market access, the project could strategically invest in systems for differentiating turmeric-based products in destination markets viz., Geographical Indications (GI), fair trade, organic, landscape certifications while helping the producer organisations to leverage such investments. As the basic support measure for market access, the project could aim at enhancing the capacities of producer organisations, support agencies and private sector partners through exposure visits; participation in trade events; investments in branding and promotion; and provision of critical value chain infrastructure (soft and hard) to improve the overall functioning of turmeric markets. The above initiatives for market access will enable

the producer organisations to get closer to profitable markets (last mile players and consumers) and improve their bargaining power for realize higher returns.

Furthermore, the project should undertake concrete initiatives to address the barriers for producer organisations in accessing finance from mainstream institutional sources. While the concerns of the financial institutions related to producer organisations' capacity and intent, market demand, documentation, regulatory compliances, and business development service assistance will be addressed through other project interventions, the focus here should be on the requirements of financial institutions primarily regarding equity (net worth) and collateral available with the producer organisations. Loan guarantee instruments such as first loss deficiency guarantee (FLDG) can be furnished on behalf of producer organisations by suitable state agencies (associated with Govt. of India / Govt. of Odisha) to suitable NBFC partners or interested banks which could improve access to working capital and term loans for producer organisations. These loans can be initially deployed to promote development of infrastructure for storage and processing of turmeric while also enabling aggregation and procurement by producer organisations from turmeric growers. Access to formal finance for producer organisations could help address critical barriers to capital (financing, technology, production facilities) and other significant needs of producer organisations to drive business growth for the benefit of turmeric growers in Kandhamal.

1.7 Proposed Export Oriented Value Chain



The AMD project envisions connecting producer organisations (FPOs) in Kandhamal directly with the markets in EU for various turmeric products. The intended objective of the project could be viewed as a multi-stage or multi-level initiative which has to systematically build the capacities of selected FPOs for catering to the demands or opportunities of more challenging buyers which would in turn enable these FPOs to realize more remunerative prices for turmeric products supplied by them. It becomes important to recognise here that the goal of supplying turmeric products to a challenging buyer (oleoresin manufacturer) or market (EU or Japan) could be relatively simpler than the goal of developing or nurturing the selected FPOs to become an influential actor in the value chains of turmeric products which serve remunerative markets such as EU. By enabling the FPO to become an influential or dominant actor in some of the targeted value chains will ensure long-term benefits not only for the associated turmeric producers but also for the underlying ecosystem for turmeric in Kandhamal. In pursuit of this goal, the focus should therefore be on building the organisational (or entrepreneurial) capacities of the selected FPO(s) especially for achieving critical scale, profitability and sophistication in its business operations especially on the postharvest and marketing side. Till the time the selected FPO reaches the critical scale, profitability and

sophistication, it would be useful for it to be nurtured or supported by a private sector partner (primarily for business development support services for product distribution, market outreach, financing mobilization, stakeholder management, systems development etc.). The above diagram of export-oriented value chain factors in the requirement of a distribution partner (essentially the business development support service provider) for accessing and serving remunerative domestic and overseas buyers. The distribution partner can collaborate with KASAM to develop a wide range of channels for distribution of turmeric in domestic and international markets. The current landscape of agritech start-ups is likely to indicate or throw up names of potential social enterprises that could meet the requirement of a business development support service provider to the selected FPO(s) while meeting their own business objective of connecting producer organisations to markets (both domestic and exports).

Before an intervention for development of agricultural value chains is initiated, there should be a clear understanding about how vertical coordination shall be achieved at various stages. This would enable the key stakeholders to align their actions for improving the value added and value realized by the intervention. For example, it would help the farmer beneficiaries growing turmeric to know whether vertical coordination would be achieved by individual sale in local mandi; by contract farming; by collective marketing in bulk; by collective marketing in value added form etc. To be successfully integrated as a market participant, a producer organisation cannot ignore the demand side issues esp. what the consumer wants (whether individual or institutional). Hence it is extremely important for the consumer or the institutional buyer to have a key role in determining what and how the growers should produce. FPOs and NGOs on their own are usually not able to have sustained engagements with the demand side of the market and have also not been able to deal effectively with the last mile middlemen. Further the dissemination of latest developments in business and technology to the producer organisations is always with a lag as against the mainstream market players who have the information advantages and financial wherewithal to avail technical know-how and business competencies on a sustained basis. It is however being realized that agricultural value chains need to be competitive and efficient if they are to be sustainable ecologically and remunerative to farmers at the same time. This needs better coordination among various value chain players without which FPOs may not be able to engage effectively with the markets on a long term basis. The incentive structures of FPOs, NGOs and public agencies facilitating the integration of producers with markets are quite different from the incentive structures that drive the mainstream market participants which many-a-times lead to FPOs becoming a dormant or a less active channel for farmers to connect with market. This has somewhat also to do with the institutional nature of the FPOs and NGOs (societies, trusts, cooperatives) which traditionally lay more emphasis on social impact vis-à-vis market competitiveness.

Since post-harvest activities like sophisticated processing, state-of-the-art warehousing, packaging, branding and other marketing activities are capital-intensive and require economies of scale in operations, federating FPOs into suitable organisation structures can make it worthwhile for FPOs to undertake such activities. Similarly, for farmers to benefit from domain knowledge and technical know-how, an integrating platform that can bring together technical specialists and domain experts for the benefit of FPOs and NGOs can be useful in facilitating capacity development and market integration. This builds the business case for involvement of a private sector partner (business development service provider) which could meet the requirement of technical specialists, domain experts and market player through its umbrella organisation.