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Learning Report

Shipment of Turmeric by Gumapadar Farmers Producer Company Ltd 2024



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Indo-German Agricultural Market Development Project

Authored by: Shamika Mone and Pratyush Ranjan Singh

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Abbreviations list

AMD	Indo-German Agricultural Market Development Project
APEDA	Agricultural and Processed Food Export Development Authority
APMC	Agricultural Produce Market Committees
BMEL	Federal Ministry of Food and Agriculture, Germany
BoDs	Board of Directors
BP	Business Plan
CEO	Chief Executive Officer
DAC&FW	Department of Agriculture, Cooperation and Farmers Welfare
DMI	Directorate of Marketing and Inspection
EU	European Union
e-NAM	National Agriculture Market
FPC	Farmer Producer Company
FPO	Farmer Producer Organization
GAP	Good Agricultural Practices
GoI	Govt. of India
GI	Geographical Indications
Ha	Hectare
ISO	International Organization for Standardization
INR	Indian Rupee
IPM	Integrated Pest Management
INM	Integrated Nutrient Management
KASAM	Kandhamal Apex Spices Association for Marketing
Kg	kilogram
MoA&FW	Ministry of Agriculture and Farmers Welfare, India
MoC&I	Ministry of Commerce and Industry, India
MRL	Maximum Residue Level
MT	Metric Ton
NIAM	National Institute of Agricultural Marketing
NABARD	National Bank for Agriculture and Rural Development
NGO	Non-Government Organizations
NPOP	National Programme for Organic Production
NTFP	Non-timber forest products
NFPF	Nedspice Farmers Partnership Programme
PHM	Harvesting & Post Harvest Management
PoP	Package of Practices
RPM	Regulated Primary Market
RMC	Regulated Market Committee
SHG	Self Help Group
SAGF	Strengthening of Agmark Grading Facilities
SFAC	Small Farmers Agribusiness Consortium
SOP	Standard Operating Procedure
VCA	Venture Capital Assistance
UK	United Kingdom

1. Executive Summary

The report details the trial shipment of turmeric by Gumapadar Farmers Producer Company Ltd (FPC), located in the Kandhamal district of Odisha, India. This initiative is part of the Indo-German Agricultural Market Development (AMD) Project, which began in 2021. The project aims to modernize agricultural markets and improve the livelihoods of rural farmers by integrating them into market-oriented value chains, enhancing their export capabilities, and fostering sustainable economic growth.

In April 2024, trial shipments of turmeric were piloted; involving four FPCs/FPOs from Koraput and Kandhamal of which one is Gumapadar FPC, the learning experience of which is under consideration.

Kandhamal district, characterized by its high-altitude terrain, dense forests, and tribal population, primarily relies on agriculture, horticulture, and forest produce. The region is renowned for its turmeric, especially the 'Kandhamal Haldi,' which has received a Geographical Indication (GI) tag.

The district has limited infrastructure for trading turmeric and ginger, with minimal adoption of digital technologies due to low literacy rates and poor connectivity. Despite this, Kandhamal is well-connected by roads, facilitating logistics and transportation. Kandhamal contributes over 60% of Odisha's turmeric production. The turmeric, often referred to as "ATM" for its quick liquidity, is cultivated using traditional methods without hybrid seeds or chemical inputs, ensuring it is organically grown by default.

The primary constraints identified include the use of low-yield local varieties unsuitable for export, lack of institutional support for farmers, inadequate processing facilities, and limited market access and product branding. Key requirements include infrastructure for grading, sorting, washing, polishing, and packaging, along with transportation and certification services.

The Gumapadar FPC is set to export approximately 75 MT of turmeric to the EU market in 2023-24, during its three planned trial shipments, of which first one commenced in month of April 2024. The trial shipment of 22 MT initiative by Gumapadar FPC represents a significant step towards integrating local farmers into international markets, addressing key constraints, and leveraging the unique qualities of Kandhamal turmeric. The AMD Project's support in technical training, infrastructure development, and market access is pivotal in transforming the agricultural landscape of Gumapadar FPC in Kandhamal, promising enhanced economic opportunities and sustainable growth for the FPC's farmers.

To upscale marketing initiatives effectively, it is essential to develop the necessary infrastructure and skills within the Gumapadar FPC. Taking ownership, gradually increasing shipments, and gaining organic certification will further bolster the market position and profitability of turmeric farmers, ensuring sustainable growth and independence from support programs like the AMD project.

The trial shipment has been a series of learning episodes not only for the FPC but even the AMD Project team. All the learnings from the different steps and process during this trial shipment have helped to prepare a Standard Operating Procedures (SOPs) for spices. These SOPs will serve as a tool for any aspiring FPCs to follow and start their own export business. The SOP is accessed at the Indo-German Agricultural Market Development Website.

2. General Overview of the Region

Gumapadar Farmers Producer Company Ltd is located in K.Nuagaon block, a hill station in Kandhamal district of Odisha state in eastern India. Kandhamal has 2 subdivisions, namely Phulbani, and Balliguda. The entire district lies in high altitude zone with inaccessible terrain of hilly ranges and narrow valley tracts, which guides the socio-economic conditions of people and development of the district. It has wildlife, scenic beauty, healthy climate and has attractions, like panoramic coffee gardens, pine jungles, Ghat roads, hills and waterfalls, virgin forest and typical tribal village life.

Kandhamal district, encompassing a geographical area of 7,654 square kilometers, is bordered by Boudh district to the north, Rayagada and Gajapati districts to the south, Ganjam and Nayagarh districts to the east, and Kalahandi district to the west. Approximately 66 percent of the district's land area is covered with dense forests and towering mountains, featuring lush green vegetation at altitudes ranging from 2,000 to 3,000 feet.



Figure 1 Kandhamal location in Odisha state in India



Figure 2 Landscape of Kandhamal in Odisha state in India

The district's economy is primarily agriculture-based, with agriculture, horticulture, animal husbandry, forest produce trading, and tourism serving as its main economic activities. Kandhamal has the lowest population density in the region and is predominantly inhabited by tribal communities. The main crops grown in Kandhamal include rice, maize, niger, pigeon pea, black gram, groundnut, horse gram, and mustard. Fruit crops such as mango, citrus, banana, guava, litchi, and papaya are also cultivated.

Additionally, the district produces medicinal and spice crops like turmeric, ginger, onion, garlic, and coriander, as well as vegetables such as cauliflower and beans. The district is a major producer of ginger and turmeric, earning a reputation for spice cultivation in India. Notably, its local turmeric, known as 'Kandhamal Haldi,' has received a Geographical Indication (GI) tag from Intellectual Property India.

The tribal population contributes to the state economy through the production of cups and plates stitched out of Sal leaves besides other Non-timber forest products (NTFP) products like Tamarind, Hill brooms, Fibres, Oilseeds, Kendu leaves, Medicinal plants, Fruits, Roots, Gums, Tuber, Flowers, Jhuna, etc. are plenty available in the district due to large forest base.

Odisha has significant potential for the production and export of ginger and turmeric. A notable aspect of ginger and turmeric farming in Odisha is that it is primarily conducted in the tribal-dominated districts of Koraput, Kandhamal, and Keonjhar. Most of these farmers are small and marginal, relying on indigenous methods of production, which results in lower productivity compared to the potential. These farmers have limited exposure to modern farming techniques and lack access to contemporary technologies and machinery. Additionally, the tribal communities are generally reluctant to abandon their traditional crop varieties and long-established farming practices.

Although there is lack of seed storage facilities and lack of exposure to improved farming methods, Ginger and Turmeric have been key spices of the state contributing substantially to the income and employment of the tribal people. Most of the Turmeric farmers in these areas resort to traditional post-harvest and storage methods. Hence, the value chain is usually not up to the mark, especially for the national and the International Markets. Generally, the farmers are immensely trade through middlemen and lack of branding and certification; limiting them to access premium domestic and international markets.

Kandhamal district features a Regulated Primary Market (RPM) in Tikabali and a Regulated Market Committee (RMC) in Phulbani. The primary crops traded in these markets include paddy and seasonal vegetables. Additionally, the Odisha Millets Mission, launched by the Government of Odisha in 2017 to revive millet cultivation, has established procurement platforms for millets, particularly finger millet.

However, there are no government-regulated markets specifically for trading turmeric and ginger in Kandhamal. While there are no direct exporters operating in the district, domestic private traders handle almost all the trade of turmeric and ginger in this region.

The adoption of digital technologies for market access is minimal, primarily due to the low literacy rate and poor connectivity with most service providers, especially during the monsoon season. Although Kandhamal lacks railway connectivity, the region is well-connected by roads, offering adequate logistics and transportation facilities.

3. Turmeric Production in 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 K.Nuagaon, Daringbadi, Raikia and Phiringia.

It has a 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 has a low water holding capacity. The pH value of the soil varies between 5.3 and 6.5, indicating its acidic nature.

Turmeric is cultivated on slopes, under rainfed conditions with or without terracing as well as in plain, in open and under shade of mango orchards, 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 after harvesting to the next planting by spreading them thinly under a cover of turmeric leaves. Also, 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 or in backyard under the shade of mango, jackfruit (*Artocarpus heterophyllus* Lam.) as these trees protect rhizomes from heat and rains and also create microenvironment to enhance the shelf life and reduce the losses.

Small and marginal farmers generally use their own seed or collected ones from fellow villagers. 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 problems in turmeric. On an average turmeric is cultivated on 0.25 ha of land.



Figure 3 Farmer in his Turmeric field



Figure Harvesting of Turmeric crops

Turmeric Crop Seasonality

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

Turmeric crop duration is of 8-9 months. The farmer starts collecting Sal tree leaves in March month for mulching. 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 mulch. Virtually, all the farmers do not apply any fertilizer, pesticide, or 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 Aluminum container for 1 hour. After the turmeric is properly boiled, the rhizomes become soft and 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 (maximum moisture of 10-12%), polished turmeric is stored in gunny bags in a dry place and later marketed.

Turmeric 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. The table below shows the characteristics of Kandhamal Turmeric.

Table: 1 - Test results from the Sampling conducted in cropping season 2022-23

SAMPLE	PARAMETERS	TEST RESULT / RECORD	SPECIFICATION
TURMERIC-FINGER	Ash	6.27% - 6.49%	8% Max
	AIA (Acid Insoluble Ash)	0.43%	2% Max
	Moisture	<9-10%	12% Max
	Volatile Oil	6.60 g/100g	Minimum 2.5 ml/100 gr [IS:1797-2017 Method]
	Curcumin	2.16% OR 3.05 g/100g	2% Min [ASTA Method 18.0]
	Starch Content (On dry basis)	52.16 g/100g	IS:4706(Part-2)-1978 Method
	Lead Chromate	ABSENT	IS:3576-2010 Method
SAMPLE	PARAMETERS	TEST RESULT / RECORD	SPECIFICATION
TURMERIC-GROUND	Ash	6.27% - 6.49%	9% Max
	AIA (Acid Insoluble Ash)	0.43%	2.5% Max
	Moisture	<8%	10% Max
	Volatile Oil	6.60 g/100g	Minimum 1.5 ml/100 gr
Ref.:			
1. Kandhamal Apex Spices Association for Marketing (KASAM), Certificate of Analysis of Turmeric Finger.			
2. Test report, First Source Laboratory Solutions LLP (Analytical Services), Sample ID: FSL5(AS)-5200303001, Hyderabad-500076, dated 08/07/2020			

4. Indo-German Agricultural Market Development Project Initiatives

The Indo-German Cooperation on Agricultural Market Development (AMD Project) began in 2021 with the overarching goal of fostering sustained economic growth in the agricultural sector and enhancing rural livelihoods. The project initiative aligns with India’s strategy for modernizing agricultural markets.

The AMD project focused its activities in three Indian states—Uttar Pradesh, Odisha, and Rajasthan, offering technical support to develop selected agri-food value chains for the farmer producer organizations (FPOs). The project activities aimed to improve the efficiency and effectiveness of domestic market marketing and to boost the export potential of specific agricultural value chains and products. Additionally, the project seeks to expand international marketing opportunities for Indian farmers.

The project specifically aims to achieve three key outcomes:

- Enhance the policy environment for agricultural market development and increase the export potential of Indian products through a dialogue platform.
- Strengthen support services and related capacities for agricultural market development.
- Integrate target farmer organizations into market-oriented value chains and enhance their access to international markets, particularly in the EU.

To integrate FPOs into market-oriented value chains and improve their capacity to access international markets, the Indo-German AMD Project has facilitated trial shipments of turmeric, coriander, cumin, and Mangoes. In April 2024, the project piloted trial shipments of spices from Odisha, Rajasthan, and Uttar Pradesh collaborating with selected FPOs of which one is Gumapadar FPC.

The AMD project has implemented its project activities in two districts of Odisha, namely Koraput and Kandhamal. For effective execution, four FPOs/FPCs—two from Koraput and two from Kandhamal—were selected on pilot basis for active involvement. These FPOs were selected based on primary random sampling from their working areas and are engaged in targeted agri-business services, supporting services, quality standards, and identifying new market and export opportunities.

A. Brief Profile of the Gumapadar FPC

Gumapadar Farmers Producer Company Ltd. (Gumapadar FPC) was established in September 2018. The FPC has been promoted by Shanti Maitree, a multi-sectoral NGO based at Kandhamal and works in 12 villages belonging to four Gram Panchayats in K. Nuagaon block of Kandhamal. The FPC has 5 active directors with an efficient CEO handling the overall functioning of the FPC. Only the CEO and the Accountant are paid directly from the FPC while the remaining 6 staff are financially supported by Shanti Maitree and the staffs are partially involved in both the NGO and the FPC activities.

The major focus of this FPC is to support livelihoods of its member farmers through a multi-sectoral approach encompassing health service provision, financial inclusion through Self Help Group (SHG) formation, educational interventions, skill development, environment conservation, social protection etc. The FPC has 1020 member farmers and around 500 farmers cultivate turmeric on 0.25 ha of land average land holding.

The Gumapadar FPC had no prior experience on trading and marketing. The turmeric value chain assessment before the trial shipment identified the major constraints as:

- **Production related Constraints:** Low turmeric productivity, uncertainty of compliances as per exports standards. The cultivation of turmeric is scattered with smaller farmlands, with no concrete business plans.
- **Institutional related Constraints:** Farmers are in a poor bargaining position with marketers / traders and there is no institutional framework with the FPC to protect the primary producers – the farmers.
- **Processing related Constraints:** There are no primary processing unit like washing, grading, segregation, packaging etc with the FPCs. There is also no value addition and lack the storage facilities.
- **Marketing related Constraints:** Farmers do not have direct market access and lack any kind of certification of produce.

B. Brief Profile of Exporter- NedSpice

The first trial shipment from the Gumapadar FPC was successful with NedSpice as the key Export Partner. NedSpice is a privately-owned group of companies with a global presence, specializing in the sourcing, processing, and distribution of spices, herbs, and dehydrated vegetables. Headquartered in the Netherlands, Nedspice operates processing facilities in key locations such as India and Vietnam. The company also maintains strategic sales offices, warehouses, and distribution centers across the Netherlands, India, Vietnam, the United States, the United Kingdom, South Africa, and China.

NedSpice since 2013/14 has initiated Nedspice Farmers Partnership Programme (NFPP). Their program invites farmers into a financially attractive and long-term partnership. Through training and on-farm support NedSpice helps to develop sustainable and profitable farms that produce high-quality and safe spices. Currently, over 4000 farmers from Vietnam and India have joined NFPP. The NFPP project areas in India are located in the states of Rajasthan, Andhra Pradesh and Kerala. In Rajasthan NFPP farmers cultivate cumin, fenugreek and fennel. In Andhra Pradesh NFPP farmers cultivate turmeric and in Kerala NFPP activities for ginger, nutmeg and turmeric are being carried out. For NedSpice, working with the farmers of Gumapadar FPC was their first experience.

5. The Turmeric Trial Shipment

Indo-German AMD project facilitated the first trial shipment of 22 metric tons of EU compliant polished turmeric fingers from Kandhamal to Kochi. Gumapadar FPC sent its first shipment to a leading Exporter 'NedSpice' demonstrating its agri-business capabilities. For facilitating trial shipment, the Indo-German AMD

project has followed seventeen major activities that spread from the pre-sowing of crop to the final dispatch of the finished product to the exporter. The section below highlights the major steps and activities implemented by different stakeholders of the trial shipment that led to successful completion of the trial shipment.

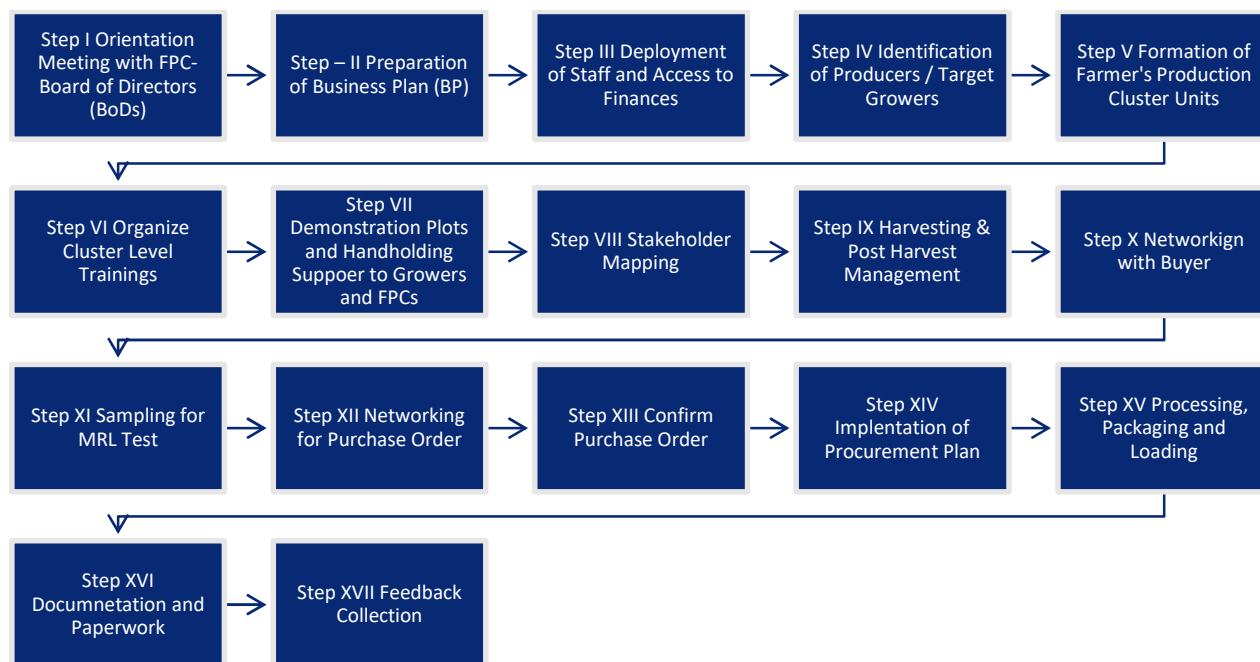


Figure 5 Snapshot of the major steps undertaken for facilitating the trial shipment

Table 2 Steps of the Turmeric Trial Shipment in Odisha state

<p>Step – I (12 months before or just before the planting season)</p>	<p>Orientation Meeting with FPC- Board of Directors (BoDs)</p> <ul style="list-style-type: none"> ➤ The AMD Project team conducted initial meetings on ‘Basic concept on trial shipment’ with all the Board members including CEO of the Gumapadar FPC to gauge the willingness and commitment of the Board of Directors and willingness to participate in the export operations. ➤ After the confirmation of the willingness, the Indo- German AMD project planned for scheduling of monthly meeting with Board members & office bearers. Monthly meetings ensured proper communication and accountability of the Board members throughout the implementation process.
<p>Step – II (12 months before or just before the planting season)</p>	<p>Preparation of Business Plan (BP)</p> <ul style="list-style-type: none"> ➤ The AMD team invited all the BoDs and office bearers of the FPC along with 3-4 progressive farmers for business plan preparation exercise. During preparation of Business Plan, they decided to frame an objective statement that includes– Total targeted quantity of the Agri-produce for domestic markets and export markets, target export markets destinations (countries), target domestic markets, commodity form (fresh/ polished/ sorted/ graded).

	<ul style="list-style-type: none"> ➤ Gumapadar Farmers Producer Company (FPC) was set to enter export operations for the EU market in the year 2023-24. The commodity forms that Gumapadar FPC can export include fresh, whole, dried, powdered, sliced, bleached, unbleached whole, dry polished fingers, and powder form. The major cultivation characteristics are primarily organic, with the first harvest tentatively scheduled for mid-January 2024. ➤ Key details of the trial shipment plan are as follows: <ul style="list-style-type: none"> • Expected Trial Shipment Quantity: Approximately 75 MT • Average Quantity of Produce Available per Farmer: 10 Quintals • Total Number of Participating Farmers: 100 • Number of Planned Trial Shipments: Three, each with 25 MT • Projected Timeline for Trial Shipments: Mid-March to April 2024 <p>Projected Infrastructure Requirements:</p> <ul style="list-style-type: none"> • Facilities for grading, sorting, weighing, washing, polishing, boiling, and packaging • Sortex machine – The machine that sorts the Turmeric fingers based on their sizes into different grades. <p>Project Service Requirements:</p> <ul style="list-style-type: none"> • Transportation • Testing and certification ➤ According to the projected status report of the AMD project before the first trial shipment, the Gumapadar FPC was well-prepared to meet the demands of the EU market while maintaining high-quality standards and efficient logistics.
<p>Step III (12 months before or just before the planting season)</p>	<p>Deployment of Staff and Access to Finances</p> <ul style="list-style-type: none"> ➤ National Bank for Agriculture and Rural Development (NABARD) has been supporting the Gumapadar FPC directly from 2018 to 2021 and also later through various forms of financial assistance channelised via Shanti Maitree. They have recently received a grant of INR 10, 00, 000 in March 2024 from National Agricultural Cooperative Marketing Federation of India Ltd (NAFED). Gumapadar FPC has applied for Small Farmers Agri-Business Consortium (SFAC) but not received the grant yet. ➤ FPC needed finances for staff, procurement of farm produce from their shareholders, transportation, and logistics. The AMD team guided the FPC to plan for the allocation of FPC's own funds as well as credit channels. ➤ For the trial shipment under consideration with a purchase order of 25 MT dried polished fingers of Turmeric, the Gumapadar FPC, had challenges for purchase of raw materials from farmers due to insufficient working capital. Short term financial arrangement was made by the FPC through different agencies and in some cases credit purchase to make the procurement of raw materials possible.
<p>Step – IV</p>	<p>Identification of Target Growers/ Producers</p> <ul style="list-style-type: none"> ➤ Progressive growers from the Gumapadar FPC were identified by the FPC.

<p>(Just before the planting season)</p>	<ul style="list-style-type: none"> ➤ The AMD project, along with FPC initiated documenting the Package of Practices (PoP) for turmeric/Ginger, field chemical application record, production cost and Maximum Residue Limit (MRL) test results. ➤ The FPC using minimal chemicals and mostly adopting traditional farming with majority negative results for the presence of EU approved active substances, were chosen.
<p>Step – V (Just before the planting season or during plantation time)</p>	<p>Formation of Farmer’s Production Cluster Units</p> <ul style="list-style-type: none"> ➤ Based on the number of farmers participating in the exports, five potential “production clusters units” were identified. ➤ The number of production clusters units were selected in such a way to comprehensively cover all the target farmers required to meet the business plan target. ➤ AMD Team identified fourteen villages with active support from Gumapadar FPC for Turmeric production namely Sirtiguda Sainpada, Jamapadar, Tilakpanga, Bikangia, Daungia, Gunjigaon, Gosukia, Panaketa, Delarpadar, Gasanaju, Gahangia, Kamangi and Dagamaha. Accordingly, two production clusters have been identified within the villages under the GPs Sirtiguda, Sainpada, Kudutuli, Badeketa and K.Nuagaon.
<p>Step – VI (Just after the planting season- till the harvest season)</p>	<p>Organize Cluster level Training</p> <ul style="list-style-type: none"> ➤ Regular <u>month-wise training calendar</u> were prepared for the farmers. The training plan considered all aspects from pre-sowing till post-harvest management operations and sessions were planned in a proper sequence during the span of eight months that covers the entire cropping season. ➤ The trainings were provided in cluster and cover all the farmers. ➤ The trainings considered thematic topics like- Principals of Good Agricultural Practices (GAP), Quality specification of export market standard, IPM, INM, PHM & NPOP certification, harvesting, Sorting and grading. ➤ Practical hands-on trainings were also provided at the farmer’s field. ➤ Record of all the training programs were maintained.
<p>Step – VII (During the cropping season)</p>	<p>Demonstration Plots and Handholding Support to Target Growers & FPCs</p> <ul style="list-style-type: none"> ➤ In each cluster ‘Demonstration Plots’, were identified. The focus of the Demonstration Plot was to showcase the benefit of export-oriented production technologies to other farmers. ➤ Handholding and technical support are provided during the land preparation, transplantation, intercultural operation, diseases and pest control and post-harvest management. ➤ The Board of Directors (BoDs) of the FPCs regularly monitored the farms and keep all the records updated.

<p>VIII (During the cropping season)</p>	<p>Stakeholder Mapping</p> <ul style="list-style-type: none"> ➤ Once the BoDs confirmed the business plan, discussion with different stakeholders – agri-startups, training /research centers, government officials, banks, financial institutions, logistic and transport service providers were undertaken, and necessary support should be requested. ➤ Initiatives were undertaken to meet the stakeholders in frequent intervals of time and keep them updated on the progress of the activities.
<p>Step – IX (Before the Harvesting Season)</p>	<p>Harvesting & Post Harvest Management (PHM)</p> <ul style="list-style-type: none"> ➤ Farmers were well trained before harvesting the crop regarding the maturity index, harvesting methods, and prevent contamination, and farm storage. ➤ Post harvest management were included to ensure proper sorting and grading. ➤ The FPC ensured that no chemicals were applied during the PHM operations. Proper clean PP bags were used to store the harvested product.
<p>Step – X (During the planting season)</p>	<p>Networking with Buyer</p> <ul style="list-style-type: none"> ➤ The AMD project facilitated networking with exporters and 4 large domestic buyers. ➤ Gumapadar FPC shared physical samples of the product that demonstrate different product forms and quality to the buyer. ➤ Several rounds of discussions were held with buyer on topics- offer quantity; timeline of product availability; quality of product that will be delivered; and price ➤ The exporter was invited to make a prior field visit to the production clusters and had physical meetings at the FPC office.
<p>Step – XI (Just on the onset of first harvest)</p>	<p>Sampling for MRL Test</p> <ul style="list-style-type: none"> ➤ Five random samples were gathered from the operational areas of Gumapadar FPC farmers, encompassing both turmeric and ginger. These samples underwent testing at the ISO-certified laboratory in Hyderabad, accredited for all EU-approved molecules and curcumin content. The purpose of sampling and testing was to ascertain the quality parameters of the harvest produce; specifically, the Maximum Residue Level (MRLs) as per the targeted EU food safety standards. ➤ Analytical sample tests were conducted at accredited laboratories immediate after the harvesting. ➤ The test reports were available within 7 days and the reports were discussed and shared with the cluster production units. Similarly, the test reports were shared with the exporter to enable exporter’s confidence.
<p>Step – XII</p>	<p>Networking for Purchase Orders</p>

<p>(During peak harvesting time)</p>	<ul style="list-style-type: none"> ➤ Just at the peak harvesting season, NedSpice was contacted and discussion related to the offer prices, quality and quantity of offered produce were carried out. ➤ After several rounds of meetings, confirmation of the price, payment terms, quality and quantity was finalized and NedSpice was requested for immediate issuance of purchase order (PO).
<p>Step – XIII (During peak harvesting time)</p>	<p>Confirm Purchase Order (PO)</p> <ul style="list-style-type: none"> ➤ After receiving the purchase order confirmation of the purchase order with the buyer was done, ensuring clarity on all aspects of the transaction. ➤ The Purchase Order states that the Gumapadar FPC has to deliver whole Turmeric dried polished fingers 25MT by 5 April 2024 and in return would receive INR 125 per Kg making a total net value INR 3,125,000. It also states that 30 % advance would be transferred from NedSpice upon loading at the warehouse. ➤ Vehicle availability arrangements were later done by the Gumapadar FPC. Two types of vehicles arrangements were done as- <ul style="list-style-type: none"> ❖ Hire vehicle-1 (Pick up / Van): Used only for procured materials collection & transportation to processing unit ❖ Hire vehicle- 2 (Lorry): For transportation / Shipping of processed materials to client / exporter delivery point ➤ A meeting was later scheduled with the processing unit with quantity.
<p>Step – XIV (After receiving the Purchase Order)</p>	<p>Implementation of Procurement Plan</p> <ul style="list-style-type: none"> ➤ The CEO of the FPC took an important role in procurement. ➤ Procurements quality standards were ensured: <ul style="list-style-type: none"> ✓ Cleanliness, contamination of foreign materials ✓ Shape/ size, color and other physical attributes ✓ Pesticide residues level ✓ Moisture content ➤ Procured raw material was shifted to the processing unit for further processing to avoid moisture loss/gain. ➤ Farmers’ payments were done on daily basis as per the agreed payment systems between the FPC and farmers.
<p>Step – XV (After the Purchase Order)</p>	<p>Processing, Packaging and Loading-</p> <ul style="list-style-type: none"> ➤ Harvested turmeric was cleaned / washed along with preliminary hand sorting, grading, then individual level boiling and sun drying is done followed by one more round of manual sorting and grading to clean the hairs on the turmeric and then the central finger and mother rhizome are separated from the rest of the fingers. ➤ Upon confirmation of the Purchase Order (PO) by the FPC, turmeric processing commenced immediately. Temporary clusters were established in various villages for procuring dried turmeric fingers from farmers. Following procurement, processing began with polishing, sorting, and

	<p>grading. When processing was 70-80% complete, a representative from NedSpice visited the FPC for quality control, confirming the quality was satisfactory at that stage.</p> <ul style="list-style-type: none"> ➤ The processing involved single polishing without double polishing. After one-hour polishing, manual sorting, grading, and cleaning were conducted by women. Subsequently, primary bagging took place. The FPC conducted quality control at their level, followed by a final check of quality and quantity before sealing the bags with stitching. Each lot was sealed and loaded onto trucks for final transport. ➤ After completing the entire processing and quality check of the lot, the FPC began packaging, filling each bag with 40 kg of dried polished turmeric fingers. NedSpice arranged the lorry, <i>and later the bag sealing, quality check and loading process was initiated.</i> ➤ The bags were loaded in presence of the exporter and weights were cross-checked.
Step – XVI- (Before dispatch of the final produce)	<p>Documentation and Paperwork</p> <p>The necessary documentation / paper works required for the trial shipment are ensured-</p> <ul style="list-style-type: none"> ❖ Collection of PO from client – FPC ❖ PO confirmation & fix loading schedule – FPC ❖ Certification and Test Reports ❖ Email to client for advance payment - FPC ❖ Generation of Invoice & E-Way Bill – FPC ❖ Reporting to Govt. / Ministry / other stakeholders - FPCs
Step XVII (After delivery of the Produce)	<p>Feedback Collection</p> <ul style="list-style-type: none"> ➤ Once the product reached the destination of the exporter, feedback from the exporter was collected on quantity and quality. ➤ The outstanding payment was later realized once the shipment reached the exporter destination.

6. Costing analysis

Table 3: Cost analysis for turmeric production and sale per acre (0.4 ha) in the AMD project site of Odisha

<u>Parameter</u>	<u>Value</u>
Average Cost of Production per Acre	INR 73,100
Cost of Production per Kg	INR 58.5 per kg
Yield and Pricing	
Production per Acre	1250 kg of dried turmeric
Average Local Market Price	INR 98 per kg
Farmer Selling Price to FPC	INR 106 per kg
NedSpice Purchase Price offered to FPC	INR 125 per kg
Farmers Profit	

Average profit of Farmer per Kg if sold to local market	INR 39.5
Average profit of farmers per Kg if sold to FPC	INR 47.5
Increment of profit per Kg if farmer sold for exports	INR 8
Cost of MRL testing (3 Samples)* Cost covered by AMD project	INR 75,000
Profit Calculation for FPC	
(A)NedSpice Purchase Price offered to FPC	INR 125 per kg
(B) Average Purchase Price of FPC from Farmers	INR 106 per Kg
(C) Cost incurred by FPC for polishing turmeric	INR 5 per Kg
(D) Cost of local transport incurred from Farm to Polishing center	INR 2.5 per Kg
(E) Cost of bagging and stitching per kg	INR 0.75 per Kg
(F) Cost of Labour for Loading and Unloading	INR 0.5 per Kg
(G) Other Charges	INR 0.5 per Kg
(H)Per Kg unit cost for FPC (B+C+D+E+F+G)	INR 115.25 per kg
Profit Margin for FPC (A-H)	INR 9.75 per kg

This analysis demonstrates that selling dried turmeric to NedSpice significantly increases the profitability for farmers compared to selling at the local market rate.

7. Emerging Lessons

A. Farmers perspective

It was seen through the semi-structured interview with farmers that farmers are motivated as they received better price for their produce. In this shipment to NedSpice, an international exporter with warehouses in Cochin, the increased price offer to FPC was highly motivational and slowly but surely the farmers are understanding the importance of avoiding the use of restricted EU approved pesticide molecules on the farm production. However, for the farmers the aggregation model for collective marketing by FPC is new and would require two to three additional business cycles to fully mature.

B. FPC perspective

The FPC started its first trial export shipment and the Export Business and acknowledged the continuous guidance and support from the AMD Project team. With the first export trial shipment, receiving higher price per Kg for turmeric to farmers has been the highest motivation for the farmers and the FPC to start the export business.

Starting with lack of awareness about the export value chains to successful completion of the trial shipment has brought new learnings for the FPC. Some of the important areas where FPC plans to strengthen are-

- The FPC requires high yielding seeds of turmeric to increase farmers' production.
- At the processing level, the FPC requires training for manpower to understand the technicalities to maintain the export quality of turmeric over the years.

- Access to quality testing centers to be available at nearby places. Access to export facilitation and the market access information.
- Access to credit and finance is always the highest priority especially in these beginning years of development.

C. Exporter perspective

NedSpice contacted the Gumapadar FPC with active facilitation from AMD project staff at a Spices Conference in Hyderabad during 2023. NedSpice decided to go ahead with the first trial shipment based on the good quality of the turmeric and the large area under turmeric cultivation.

They are satisfied with the first trial shipment considering the quality, colour and curcumin content as promised before the shipment. They understand that the Gumapadar FPC is a newly formed FPC and would take them 3-5 years to establish strong enough to provide higher quantities of 200 MT. This time the FPC was supposed to supply 25 MT and was able to do it as promised.

NedSpice understands the Gumapadar FPC challenges of not having good quality processing, polishing and cleaning equipments and shortage of manpower at the current stage of its development. It is recommended that the FPC develops this infrastructure and manpower over years such that maintain this good quality for higher quantities in the future.

D. Indo-German AMD project perspective

The trial shipment has been a series of learning episodes not only for the FPC but even the AMD Project team. All the learnings from the different steps and process during this trial shipment are put down into Standard Operating Procedures (SOPs) for Turmeric. These SOPs will serve as a tool for any aspiring FPCs to follow and start their own export business.

The FPC was able to do this trial shipment only because of the active support from the AMD project assistance and handholding. So, for the FPC to stand by itself in the export market field, may require some more years of hand holding but needs a formation of the exit strategy for AMD from the Gumapadar FPC for its sustainable survival in the future.



Figure 6 Sorting and Grading of Turmeric Fingers



Figure 7 Packaging of Turmeric Polished Fingers

8. The challenging scenarios

Table: 3 – Challenging Scenarios from different Actors of the Value Chain of Turmeric under Consideration

Sr. no	Actor	Challenges faced	How was the challenge addressed?	Was the challenge addressed completely, partially or unaddressed?
1	Farmers	<p>Adoption of package and practices that are compliant to EU food safety standards:</p> <p>Farmers in the region practice traditional methods of cultivation. However, some of the farmers have started using chemical fertilizers and pesticides that are not compliant with the international food safety standards. If such farmers are part of the trial shipment, the chances of export rejection are high.</p> <p>Efficient Harvesting to meet EU standards:</p> <p>Farmers find turmeric harvest challenging, especially uprooting the entire rhizome with fingers and sizing and sorting it to meet EU standards. Further, the harvesting, boiling and drying methods are traditional and non-hygienic. The chances of soil borne contamination is high.</p> <p>Traceability system:</p> <p>Farmers level traceability system is required to trace the quality of the produce and practices adopted by farmers.</p> <p>Certification system:</p> <p>In order to access the international premium markets, certification under NPOP or GLOBALG.A.P etc is important. The farms of the farmers are currently uncertified.</p>	<p>Farmers and FPOs were oriented towards the EU MRL standards and EU approved active substances.</p> <p>Farmers level record and demonstration plots were introduced by the project.</p> <p>Farmers were trained in safe harvesting methods and encouraged to use plastic layers for drying.</p> <p>The project prepared an IT platform to cater the farm level data in digital form.</p> <p>The project in the initial first year, had trained the farmers on different certification systems related to spices.</p>	<p>Partially.</p> <p>Though farmers are now trained, it takes several years of practice and constant awareness to achieve perfection. It's also important to learn that the international standards are frequently changing, and farmers should be aware of the changes through an established mechanism.</p> <p>Partially: Due to limitation of the resources, the IT platform couldn't be implemented.</p> <p>Unaddressed: Certification systems are expensive for resource constraint farmers. Government policy related to subsidization of certification cost may encourage farmers to apply for certification.</p>
2	FPC	<p>Lack of FPC experience with output agri-business:</p> <p>The FPC didn't have prior experience with agri trading and exports. The initiative for them was new and were dealing with exporters for the first time.</p> <p>Lack of contacts with domestic buyers and exporters:</p> <p>The FPC did not have networks with the existing buyers and exporters</p>	<p>The project oriented the FPC members on different aspects of agri-business and marketing.</p> <p>The project facilitated the field visits of exporters and domestic buyers and helped the FPC to</p>	<p>Partially: As learning from agri-business is evolving, the FPC are learning to better handle the agri-business.</p> <p>Addressed: For the first year, the project has facilitated building networks. However, the FPC needs</p>

	<p>Computation of price markup:</p> <p>FPC has no prior experience of calculating the price mark-up and communicating the offer price to the exporter. Price negotiation is dynamic, and it differs based on the existing daily domestic market prices.</p> <p>Lack of financial capital to operate the business:</p> <p>The FPC had meager working capital to procure and process the turmeric.</p> <p>Lack of Marketing managers for procurement and quality check:</p> <p>The FPC had few staff and were not competent to manage real time business.</p> <p>Delay in trial shipment timeline:</p> <p>The trial shipment's processing, packaging, and loading was expected to take 7 days but actually took 14 due labor shortages.</p> <p>Frequent power cuts with no generator backup for the export shipment, delayed the processing process. While sorting and grading continued manually, the polishing unit halted, delaying the bagging process and the entire shipment.</p>	<p>establish business relationships.</p> <p>The project facilitated the FPC in calculating the price mark-up and later this helped the FPC to communicate the offer price to the exporter.</p> <p>The project facilitated the advances for the working capital were accessed from the Agri-startup and from the exporter.</p> <p>The project facilitated identification of new workforce and leveraged support from the Agri-startup for procurement and quality checks.</p> <p>Along with the FPC, the Project could only facilitate sorting and grading, but polishing unit operations were on halt as it requires skill labour.</p>	<p>to participate in buyer-seller meets and establish further contacts.</p> <p>Addressed: Based on the trial shipment exercise, the FPC are now able to calculate the price-markup and derive an offer price.</p> <p>Addressed: For next business operations, the FPC should contact the formal banking system and micro finance companies for short term loan.</p> <p>Partially addressed: In future, FPC should appoint full-time marketing manager for procurement and quality checks.</p> <p>Rules of HR apply to the labours as well. Difficult to resolve without active leadership from the FPC. Not resolved this time. Fund availability to the FPC may help to resolve by having a generator backup in future.</p>
	<p>Need to identify efficient processes:</p> <p>The FPC utilising about 15 women labour workers for sorting and grading, effective labour management is needed to reduce the cost of processing.</p>	<p>Making smaller groups of 4 women labour workers for sorting and grading in segregated places is faster and effective when it comes to bigger workload.</p>	<p>Addressed completely for this trial shipment.</p>
	<p>Labour management and shift operations:</p> <p>When the workload is more as for this trial shipment, it's good to workday and night. But if the same set of people works day and night then the next day they arrive late, and the efficiency is lost.</p> <p>One needs separate teams for sorting and grading. For this shipment it was the same team doing both the actions of sorting and grading and hence one requires more time for such bigger workload.</p>	<p>Could not be resolved due to less number of workforce and fund availability.</p> <p>For such cases, one should have higher number of workforce so that two teams can be formed one for day and another for the night or one for grading and one for sorting.</p>	<p>Not addressed this time. With the active leadership from the FPC and availability of funds may help to address this challenge.</p>
	<p>Lack of local logistic coordination:</p> <p>Before polishing is started, sufficient amount of raw material should be</p>	<p>Could not be resolved due to a smaller number of skilled workforces.</p>	<p>Not addressed this time. With the active involvement and ownership from the FPC and capacity building will help to address this challenge.</p>

		available at the processing centre. Many times, at the polishing centre, one lot polishing was complete, but the next lot has not reached the procurement centre. Such time lapse due to lack of coordination with the local logistics from procurement centre to the processing centre led to the overall delay.		
		Local commitments between FPC and Polishing Unit: There was no formal contract between the FPC and the processing unit. The agreement was verbal.	Due to verbal commitment and frequent changes in the communication staff, there was ambiguity in the timeline and adherence to the responsibilities.	Partially addressed. An internal agreement between the FPC and the processing unit would help to prevent this in the future and enhance responsibility.
		Payment and Finances: The tribal workforce at the processing center demands daily cash payments. If paid every five days via bank, they lose interest and may not return to work. The processor head refused to load the final product without immediate cash payment at the last moment in demand of immediate cash instead of cheque.	Not addressed this time as all payments were made through cheques	Access to finances and immediate cash may resolve this partially such that the FPC ensures daily payments to maintain labor commitment and farmer trust.
3	AMD Field Executive	FPC further need to improve their agri-business activities through increased ownership: For the FPC it's important to move forward from production related processes to agri-business development. FPC should demonstrate their capabilities with increased ownership in agri-business activities.	Partially addressed as FPC is new and would require time to learn the business operations.	AMD Project needs an exit strategy to be in place such that the FPC takes ownership for their sustainable future.
4	Exporters	Quality adherence for each lot As quality standards must be maintained in each lot, the exporter must check the quality before delivery from the FPC.	The exporter appointed a person from their team to check the quality.	Addressed.

9. Recommendations

Capacity Building and Infrastructure Development

Nurture Gumapadar FPC members with skills in marketing, sales negotiation, and customer relationship management. Developing proper storage facilities to maintain the quality of turmeric, reduce post-harvest losses, and enable bulk storage for better price negotiation. Establishing small-scale processing units for cleaning, drying, and packaging turmeric, ensuring value addition at the local level.

Financial Support

Facilitate access to credit for Gumapadar FPC to invest in necessary infrastructure, inputs, skills development and technology. Explore options like microfinance, cooperative banks, and government schemes. FPC can apply for relevant subsidies and grants for organic farming, infrastructure development, and marketing initiatives.

Incremental Scaling

Increase the number of shipments progressively to build operational experience, market credibility and gain independence. Use each shipment as a learning opportunity to refine logistics, understand market preferences, and improve product quality and consistency. Develop robust logistics and supply chain management practices to handle larger volumes efficiently and cost-effectively. Secure long-term contracts with buyers to ensure consistent demand and stable pricing. Establish a feedback mechanism with buyers to continually learn and improve product quality and customer satisfaction.

Organic Certification through NPOP

Explore subsidies for organic certification through agencies like APEDA or schemes under the Large Area Certification program to reduce the financial burden on farmers. Leverage government schemes that provide financial assistance or subsidies for organic farming and certification processes. Though, organic is gradually becoming less of a niche product in some parts of the world, there is still enough scope and demand that certified organic turmeric can attract premium prices in both domestic and international markets. Certification may open doors to new markets, including high-value organic markets in Europe, North America, and Asia.

Branding and Diverse Market Strategies

Create a distinct brand for the turmeric produced, emphasizing its unique qualities, origin, and organic status. Introduce value-added products like turmeric powder, capsules, latte, shots and extracts. These products often command higher prices and can attract different market segments. Attending national and international trade shows to showcase the product, network with potential buyers, and understand market trends.

Strengthen Market Linkages

Develop relationships with more buyers like NedSpice. Explore partnerships with domestic and international spice companies, organic product retailers, and specialty food markets. Utilize e-commerce platforms to sell turmeric directly to consumers, enhancing profit margins by eliminating intermediaries.



Indo-German Cooperation on Agricultural Market Development

Building sustainable partnerships

Agricultural Market Development

Office Address:

Indo-German Cooperation on Agricultural Market Development

C/o CCS National Institute of Agricultural Marketing (NIAM)

Bambala, Kota Road, Pratap Nagar

Jaipur-302033 (Rajasthan) India