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Value chain analysis of organic turmeric in Kandhamal district of Odisha

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Abstract

The present study entitled “*Value Chain Analysis of Organic Turmeric in Kandhamal District of Odisha*” was undertaken with the objectives to develop a conceptual model incorporating various stages in value chain of organic turmeric; to describe important marketing channels and actors involved; to estimate the costs and margins at different stages in value chain of organic turmeric and to identify constraints faced in turmeric marketing. Multistage purposive cum random sampling method was used for selection of respondents. The present study was carried out in Kandhamal district putting special emphasis on three blocks Daringbadi, Raikia, K. Nuagaon. From each block, four villages were selected purposefully. In all 120 Turmeric growers were selected. The analytical techniques viz. Descriptive analysis, SWOT analysis, Price spread analysis; Marketing Efficiency Index, Partial budgeting and Garrett’s ranking were used for the study. The asymmetry in the information flow was clearly evident in the chain. It is observed that there were three marketing channels in the study area. Marketing efficiency of organic turmeric was found to be 0.66, 0.67 and 0.33 in channel-I, channel II and channel III respectively (using Acharya’s method). The analysis shows that channel II is more efficient among the three. Further, on constraints faced by farmers, traders and KASAM were sided and some policies were suggested to improve the livelihood of the small producers. The study highlights the importance of collective action of producers to obtain easy access to the international markets. Financial support to the producers not only helps them to increase productivity as well as to makes a way to come out of the clutches of the middlemen.

Keywords: organic, turmeric, value chain, marketing, SWOT, certification JEL codes: M₃₁, M₃₈, O₁₃, Q₁₁, Q₁₃

1. Introduction

A value chain is the whole series of activities that create and build value at every step. Value chain analysis is a strategic tool used to analyze internal firm activities. In general adding value is the process of transforming a product from its original state to a more valuable state. Today, in order to increase the quantity of the output, quality has been sacrificed and it has turned into a serious problem. Hence, it is the need of the hour to use the farming techniques which are safe for the environment and one such technique is ‘Organic Farming’. On the other hand, consumers are becoming more demanding in terms of quality and safety of food commodities. Further there can be huge market for organic instant food products like ready to cook containing the perfect blend of organic spices. Organization of agriculture along the value-chain framework has been conceived as one of the strategies to bring more efficiency in the agricultural sector. Changing demand in the global market for organic products and the growing interest of organic products also require matching appropriate design and structure of the value chain for the products. In the context of this article, value chains analysis of organic turmeric will be presented. The initiative is to understand the working of the production practices and supply chain prevailing and recommend to achieve the goal of marketing and make the district as an organic spice marketing hub not only in Odisha but also in India as well as in international level.

Turmeric (*Curcuma longa* L), is the sacred spice of India also known as ‘Indian saffron’ is an important commercial spice crop grown in India. It is known as the “golden spice” as well as the “spice of life”. The plant is propagated from rhizomes. The rhizomes are generally planted in May-June and ready for harvesting in about 8 to 10 months after planting. It is used in diversified forms as a condiment, flavoring and coloring agent. Curcuma is now gaining importance all over the world as a mighty cure to combat a variety of ailments, as the genus carries molecules credited with anti-inflammatory, hypocholesteremic, cholera tic, antimicrobial, ant rheumatic, anti-fibrotic, anti-venomous, antiviral, antidiabetic, antihepatotoxic and anticancerous properties as well as insect repellent activity (Chattopadhyaya *et al*, 2004).

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Kandhamal Haldi

Kandhamal is the major turmeric growing district of the state. It is the main cash crop for their economic development. Kandhamal Turmeric is an important product and now become popular in the organic food market of Europe and North America. The local variety grown from time immemorial is having 2-3 percent curcumin, 12-15 per cent of oleoresin and 5.3 per cent of volatile oil.

Kandhamal Apex Spices Association for Marketing Kandhamal (KASAM)

It is an exporting company situated in the district with HQ at Kandhamal. The motto of KASAM is to generate employment, poverty alleviation, extension of spice area, production of quality and value added hygienic spices. In order to export the organic spices from the district KASAM has entered an agreement with the CUC (Control Union Certification) of Holland.

Objective of the study

- To develop a conceptual model incorporating various stages in value chain of organic turmeric.
- To describe important marketing channels and actors involved.
- To estimate the costs and margins at different stages in value chain of organic turmeric.
- To identify constraints faced in turmeric marketing and to suggest appropriate measures to improve the situation.
- Hypotheses of the study
- The study is based on the following hypotheses
- Farmers are having lack of technical knowledge and improved cultivation practices.
- Production of organic turmeric is profitable.
- Regulated markets and farmer's organization are highly useful in improving value chain of Organic turmeric.
- The existing price policy is not favorable to the growers.
- Prices of turmeric are highly fluctuating from season to season and within season.

2. Materials and Methods

2.1 Nature and Sources of Data

The study is both qualitative and quantitative in nature, since it involves more of observing and understanding the conditions in marketing in the study region. Multistage purposive sampling cum random selection procedure was used for selection of district, block, village, trader, processor, retailer and farmer required for the study. Three major Turmeric growing blocks were selected from the selected district based on highest area under the crop. From each selected block four villages were chosen. Thus a total of twelve villages from three blocks were selected for the study. From each village 10 farmers growing Turmeric were randomly selected. In all 120 Turmeric growers were selected.

2.2 Conceptual Framework

Based on theoretical concepts and empirical studies, a conceptual framework is presented in figure 2.1. The framework helps in understanding the marketing chain process in the value chain of organic turmeric. This involves various actors either in national level or the international level. Producers have to comply with these standards in order to access the international markets. Nevertheless, profit margins are also the driving factors in the international market.

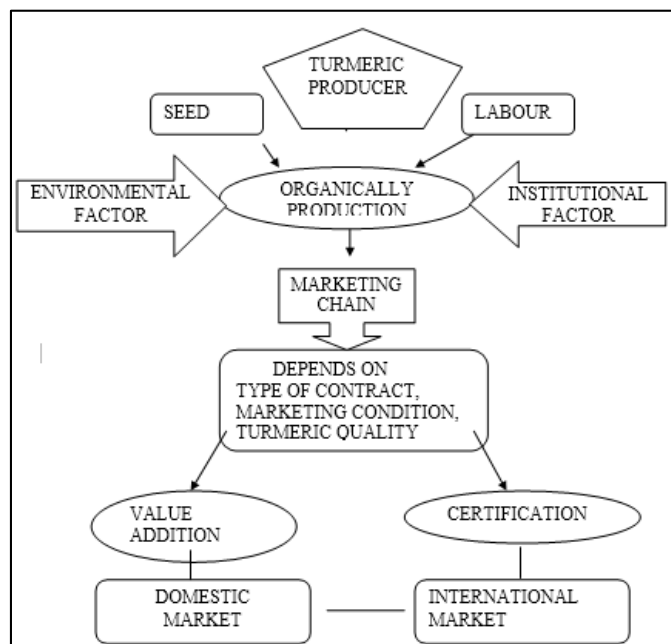


Fig 2.1: Conceptual frameworks on Indian organic turmeric marketing

2.3 Tools for Analysis

Averages and percentages were used to examine the characteristics of sample farm households. To indicate the current constraints and future possibilities of the organic turmeric farming system in Kandhamal district SWOT analysis technique was used. Three marketing channels were identified in the marketing of turmeric in the study area. Price spread analysis was carried out to determine Producer's share in consumer's rupee. The marketing efficiency of different marketing channels for Turmeric was estimated using three important methods like Conventional Method, Shepherd's Method, and Acharya's Approach. For examining the cost of production of turmeric, the various cost concepts are used like Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2. Partial budgeting technique was employed to anticipate changes in costs, returns and profitability for a minor modification. The Margin of middleman was calculated as the difference between the total payments (cost + purchase price) and receipts (sale price) of the middle man. To document the constraints faced by farmers, traders and processor during production and marketing in the region. Garrett's ranking technique was used.

3. Results & Discussion

The primary data collected during the survey and secondary data collected from various institutional sources were analyzed in relation to each of the specific objectives of the study and results have been discussed.

3.1 Socio economic characteristics of the sample respondents

The socio-economic profile of the Turmeric growers of the study area is presented in Table 3.1. The data shows that, due to illiteracy, the traditional farmers are unaware of the positive impacts of improved method of cultivation. Among the respondents 44.16 % come under 36-45 years and 31.66 come under 46-55 years. This might be due to the fact that, the youngsters were not involved in the agricultural professions as they were looking for jobs in more lucrative service sector. The analysis of the occupational pattern of the sample respondents revealed that, in the study districts, all the

sample farmers practiced agriculture as main occupation. Livestock is an important source of income for farm families.

Adding livestock to cropping system significantly reduces the risks associated with farm income.

Table 3.1: Socio Economic Characteristics of Sample Respondents (n=120)

Sl. No.	Particulars	Unit	Number of farmers	Percentage of total
I	Age group of the farmers	Number		
	Below 35 years		17	14.16
	36 - 45 years		53	44.16
	46 – 55 years		38	31.66
	Above 55 years		12	10
	Average age		43	
II	Education	Number		
	Literate		76	63.33
	Primary		24	20.00
	Secondary		20	16.66
III	Family Type	Number		
	Nucleus		65	54.16
	Joint		55	45.83
IV	Family size	Number		
	Small (2-4)		26	21.66
	Medium (4-6)		78	65
	Large (>6)		16	13.33
	Average family size		6	
V	Livestock status	Number		
	Goat		87	7.88
	Hen		80	25.64
	Cow		44	14.18
	Buffalo		39	12.5
	Sheep		62	19.87
VI	Agriculture as occupation	Number		
	Main		72	60.00
	Subsidiary		48	40.00
VII	Average Annual Income	Rupee		
	Main		62598	
	Subsidiary		38695	
VIII	Average area under Turmeric	Hectare		
	Traditional farmer		1.57	
	KASAM farmers		1.41	

3.2 Conceptual framework of organic turmeric value chain-incorporating various stages

A simplified conceptual framework for understanding the various stages and actors in value chain of organic turmeric is shown in Fig 4.1. The different stages present in the value chain are shown below.



The main actors/participants in the value chain include farmer, small trader, big trader, processor, retailer and KASAM who operate in the marketing of organic turmeric. The farmers are not organized, they sell turmeric individually, and there are no organizations or collective action while selling organic turmeric. The farmers in the district sell their produce either to trader or KASAM. So far as KASAM is concerned, it forms spice development society (SDS) in

respective blocks which consist of 300 farmer members with one president and one secretary. The traders are connected to the big traders and processors. Some farmers also sell their produce directly to the big trader. The KASAM is one, who acts as an agent between farmers and export client in national and international marketing of turmeric. There are about 28-30 mills present in district. Apart from these, one processing plant of KASAM is situated at Bandhagada.

3.3 SWOT analysis of turmeric value chain

This strategic planning method was used to evaluate the strengths, weaknesses, opportunities and threats involved in turmeric value chain. During designing of conceptual framework different interventions and adequate provisions need to be created for addressing the weakness and threats for the strengthening and growth of organic turmeric, therefore the SWOT tool was used in this context.

Input	
Strength	Weakness
<ul style="list-style-type: none"> • Less irrigation required • Required less capital investment • No need of chemical fertilizer • Availability of cultivable land 	<ul style="list-style-type: none"> • Limited access to modern technology • Lack of scientific drying yard • No organic manure used • Traditional farming practices • No improved variety available • No technology transfer training are received by farmer

Opportunity	Threat
<ul style="list-style-type: none"> • Research needs on varietal improvement and other practices • Man power • Purely organic 	<ul style="list-style-type: none"> • Degradation of local and races
Production	
Strength	Weakness
<ul style="list-style-type: none"> • Fertile soil • Favourable climate • Need less care 	<ul style="list-style-type: none"> • Low yield • No use of irrigation
Opportunity	Threat
<ul style="list-style-type: none"> • Land under turmeric cultivation can be increased • Employment of poor • Environmental friendly • Scope of more value addition 	<ul style="list-style-type: none"> • Deforestation • Incoherent government policy • Low curcumin content • Colour of turmeric
Marketing	
Strength	Weakness
<ul style="list-style-type: none"> • Easy and long storage capacity • Medicinal value • Daily kitchen requirement • Industrial use • High preservative value 	<ul style="list-style-type: none"> • No market information system • Actual market demand not known
Opportunity	Threat
<ul style="list-style-type: none"> • Expanding national international market • Value addition potential 	<ul style="list-style-type: none"> • Marketing and price risk

3.4 Important marketing channels and actors involved, and price spread analysis at different stages of value chain of turmeric

An efficient marketing system always ensures higher levels of income for the farmers by reducing the commission on marketing services of farm products. There were three predominant channels identified in Kandhamal district.

Marketing channels

The prevailing three marketing channels identified in the study area are

Channel-I

Producer → Small trader → Big trader → Processor Retailer → Consumer

Channel-II:

Producer → Big trader → Processor → Retailer → Consumer

Channel-III

Producer → KASAM → Processor → Retailer → Consumer

In channel-I, small trader act as the important market intermediary and producer sell the produce to the trader with keeping very low profit. Approximately 75-80 per cent of the produce of the district go through this channel.

In channel-II, farmer directly sells the produce to the big trader by investing some marketing cost. In this channel, farmer get some more return but to go through this farmer has to supply more as per the demand of the big traders, but the farmers are mainly marginal and small they can't fulfill the demand. In this channel approximately 10-12 per cent of the produce goes through.

In channel-III, KASAM is the main linkage to export the product to national as well as international destination. It helps in making organic turmeric as a notified commodity of Kandhamal district. Due to some obstacles like quality parameter, criteria for organic certification; dominance of local trader KASAM is unable to catch more percent of the

market. Nearly 5 to 8 per cent of the total produce goes through this channel.

Price spread analysis

It is the difference between the price paid by the consumer and the price received by the producer. It mainly consists of marketing cost and marketing margin.

Price spread of marketing in channel-I

Producer → Small trader → Big trader → Processor → Retailer → Consumer

Table 3.2: price spread analysis of channel I

Sl. No	Particulars	Rs/Tonne	Percentage
1	Farmer cost	5580	4.65
2	Price received by the producer	48000	40.00
3	Small trader purchase price	48000	40.00
4	Market Cost of small trader	1100	0.91
5	Net margin to the small trader	1900	1.58
6	Large trader purchase price	51000	42.5
7	Market Cost of big trader	700	0.58
8	Net margin to the big trader	5300	4.41
9	Processor purchase price	57000	47.5
10	Cost of processing	4000	3.33
11	Net margin to processor	7000	5.83
12	Processor selling price	68000	56.66
13	Marketing cost of retailer	15200	12.66
14	Net margin to the retailer	36800	30.66
15	Retailer selling price	120000	100
16	Price spread	CP- PP=72000	60.00

$$P_s = \frac{P_f}{P_c} \times 100$$

$$= \frac{48000}{120000} \times 100 = 40.00$$

The price spread in channel-I was found to be Rs. 72,000 (60.00%). The producer share in consumer rupee in channel-I was 40.0 %.

Price spread of marketing in channel-II

Producer ➡ Big trader ➡ Processor ➡ Retailer ➡ Consumer

Table 3.3: Price spread analysis of channel II

Sl. No	Particulars	Rs/Tonne	Percentage
1	Farmer cost	5580	4.65
2	Marketing cost of farmer	200	0.16
3	Price received by the producer	49000	40.83
4	Big trader purchase price	49000	40.83
5	Market Cost of big trader	700	0.58
6	Net margin to the big trader	7300	6.08
7	Processor purchase price	57000	47.5
8	Market Cost of processor	4000	3.33
9	Net margin to the processor	7000	5.83
10	Processor selling price	68000	56.66
11	Marketing cost of retailer	15200	12.66
12	Net margin to the retailer	36800	30.66
13	Retailer selling price	120000	100
14	Price spread	Cp-pp=71000	59.16

Note: Price received by the producers: Rs.49 per kg.

Producer's share in consumer's rupee in channel –II

$$Ps = \frac{48,800}{1,20,000} \times 100 = 40.66$$

The price spread in channel-II was found to be Rs. 71,000 (59.16%). The producer share in consumer rupee in channel-II was 40.66 %.

Price spread of marketing in channel-III (including KASAM and exporters)

Producer ➡ KASAM ➡ Exporter ➡ Processor ➡ Consumer

Table 3.4: Price Spread Analysis of Channel III

Sl. No	Particulars	Rs/Tonne	Percentage
1	Farmer cost	5980	2.99
2	Price received by the producer	50000	25.00
3	KASAM purchase price	50000	25.00
4	Marketing Cost Incurred by kasam	20916	10.45
5	Net margin of KASAM	44084	22.04
6	Trader purchase price	115000	57.5
7	Trader marketing cost	800	0.44
8	Net margin of trader	2200	1.10
9	Trader selling price	118000	59.00
10	Processor purchase price	118000	59.00
11	Marketing cost of Processor	4000	2.00
12	Marketing margin of Processor	8000	4.00
13	Processor selling price	130000	65.00
14	Retailer purchase price	130000	65.00
15	Marketing cost of retailer	23000	11.5
16	Marketing margin of retailer	47000	23.5
17	Retailer selling price	200000	100
18	Price spread	Cp-Pp=150000	75.00

Note: Price received by the producers: Rs.50 per kg.

Producer's share in consumer's rupee in channel –III

$$Ps = \frac{50000}{200000} \times 100 = 25.0$$

In channel-III, as the product is purely organic i.e. certified, so it fetches more prices in the domestic market. Though farmer gets more prices as compared to other two channels, but the marketing cost incurred by the KASAM was higher than others due to more value addition and certification cost.

3.5 Marketing efficiency associated with the prevailing marketing channels

Table 3.5: Marketing Efficiency of Different Marketing Channels

Sl. No	Particulars	unit	Channel -I	Channel -II	Channel-III
1	Retailer's sale price or consumer's purchase price	Rs. Per tonne	120000	120000	200000
2	Total marketing costs (MC)	Rs. Per tonne	21000	21200	48716
3	Total net margin of intermediaries (MM)	Rs. Per tonne	51000	51100	101284
4	Net price received by farmers(FP)	Rs. Per tonne	48000	48800	50000
5	Value added (1-4)	Rs. Per tonne	72000	71200	150000
Index of Marketing Efficiency					
6	Conventional method (5/2)	Ratio	3.42	3.35	3.07
7	Shepherd's method (1/2)	Ratio	5.71	5.66	4.10
8	Acharya's method (4/(2+3))	Ratio	0.66	0.67	0.33

Marketing efficiency of organic turmeric was found to be 0.66, 0.67 and 0.33 in channel-I, channel-II and channel-III respectively (using Acharya's method). Therefore, Channel – II is more efficient than channel –I followed by Channel-III.

3.6 Actors Involved In the Value Chain of Organic Turmeric

Production stage

Two types of farmers are engaged in turmeric production:

1. Traditional turmeric farmers
2. KASAM farmers

The produce from the first category of farmers enter the local market and then to domestic market by the intermediaries like small and big trader. KASAM farmers sell most of their

produce to KASAM there by the produce was processed and sold in the national as well as international market. In most cases market information was inaccessible to general farmers and they have to depend on the information provided by village level traders or collectors. Generally, the farmers have small and low cash resources. The financial need is sometimes met by the collectors who provide certain amount of loan to farmers in condition that the produce has to be sold to the loan providers.

KASAM purchases the produce from the contract farmers by giving remunerative price to the farmers. KASAM reaches to the farmers at post-harvest stage by providing boiling drum, polythene for drying, in recent future it plans to provide mechanical dryer for scientific drying.

3.9 Cost and Returns in Turmeric cultivation

Labour Utilization Pattern in Turmeric cultivation

It was evident that turmeric cultivation is labour intensive, for cultivation of one ha of turmeric a total of 115 man days of labour are required out of which 73 man days of male labour, 32 days of woman labour, 10 pair days of bullock labour were utilized. In case of post harvest operations like boiling and drying of turmeric, 12 man days of male labour, 8 days of woman labour were utilized per hectare. Out of the major cost in the production of fresh turmeric, the highest cost is incurred in labour cost; this is due to lack of modern technology.

Input Utilization Pattern in Turmeric cultivation

The resource poor farmers in the study area don't use any input except seed (20 q/ha) of the previous year. This might be due to lack of technical knowledge. Even they don't use any irrigation for their crop, they only depend upon rain water, which ultimately reduces the figure yield. They are unaware about use of any organic input like organic manure, bio fertilizer, pesticides etc which can boost their yield.

Cost and returns structure in turmeric cultivation

The total cost of cultivation of the Turmeric growers was found to be Rs 52200. In case of KASAM growers in the study area, the total cost of dried Turmeric production of the sample KASAM farmers (Rs 558/q) was found to be more than the traditional farmers (Rs. 522 /q). Yield of Turmeric crop in case of traditional Turmeric farmers and KASAM farmers was same i.e. 100 quintals per ha. After processing (boiling and drying) which yields into 20 q / ha. But the average price received by them were Rs48/kg and Rs 50/kg respectively. The net returns per quintal of dried Turmeric production for these two categories were found to be Rs 42420 and Rs 44120 respectively.

3.10 Partial budgeting of primary processing functions carried out by the sample respondents in the study area

This is a technique used to test the profitability for a minor modification done at the farmer level. When the farmer undertake the pre-processing activities like boiling and drying after harvesting it fetches more price than the existing i.e. selling raw turmeric. It was also seen that sometimes raw turmeric also fetches more price than dry because of the demand and supply condition. But in overall the pre-processing brings more return to the farmer. From the marginal analysis it is concluded that by adopting the proposed modification the farmer get a worth of 13400 per ha as net change. so in this context it was concluded that farmer should undertake some value addition so that he can get more return with low investment

3.11 Processing activities and margin at each stage of the value chain

The turmeric goes through various value additions from production to final consumption. However, the major value addition done prior to reaching the domestic consumer mostly include primary processing or making dried turmeric and secondary processing of making powder out of dried ones. The tentative calculation done by assuming the price of the dried turmeric to be at Rs 48/kg and that of powder to be at Rs 120/Kg to the consumers. However, due to high fluctuation of price, especially of dried turmeric (from Rs45 to Rs 75 in 2015), the selling price and profit margin can alter

significantly. When the farm gate price is Rs 48/Kg, there is a margin of Rs 4.02/kg approximately to the farmers. since most of the farmers conduct boiling and drying activities, the profit margin of the farmers can reach to Rs 4.02/Kg while selling in dried form. When sell in raw form the margin reach to Rs 2.78 /kg. The local traders purchasing dried turmeric, with small processing (cleaning, polishing, storage) and selling it to the big trader making an approximate profit of Rs 3 /Kg with their selling price of the dried turmeric being Rs 51/Kg. The big trader purchase the semi processed dried turmeric from the small traders and selling it to the wholesaler (processor) with a profit margin of Rs 6 / kg with their selling price Rs57/kg. The greater value addition is done during the processing of the powder with packaging and marketing. The profit margin for processors is approximately Rs11/kg, while selling at Rs 67/Kg. Since, the market price for the powder is moreover constant; the profit margin of the retailer varies significantly with variation in price of dried form. The estimated average profit margin for the wholesalers comes around 5.83% and that of retailer is 30.66%.

3.12 Losses associated with processing at each stage

The major loss occurs after the pre-processing of harvested turmeric i.e. boiling and drying. The conversion ratio from fresh to dry is kept as 1:5, i.e., from the 500 Kg fresh turmeric, 100 Kg dried turmeric is produced. But to get more return farmer himself carried out these operation with their own cost. From the partial budgeting analysis done in the previous chapter it was concluded that with this pre-processing farmer gets extra Rs 13,400 per hectare as dried turmeric fetch 4 to 5 times more price than raw turmeric. At the processing (wholesaling) level a loss of 25 % was calculated i.e. from 1 kg dried turmeric 750 gm of powder turmeric was obtained. At the retailer level also a loss of 5% was considered.

3.13 Constraints faced in production and marketing of Turmeric in the study area

The district has a very good scope for organic cultivation, but there are so many constraints present in the study area. The farmers as well as traders and KASAM face problems during the production and marketing of organic turmeric.

Constraints faced by the farmers in the study area

The major constraints faced in cultivation of Turmeric in the study area are presented in Table 3.8,9,10 The study revealed that the major problems faced by the growers in production is high cost of labour followed by personal obligation, financial weakness etc.

Table 3.8: Constraints faced by the farmers in the study area (n=120)

Sl. No	Constraints	Score	Rank
1	High cost of labour	76.40	I
2	Personal obligation with traders	71.24	II
3	Financial weakness	70.20	III
4	Lack of technical knowledge	56.90	IV
5	Lack of storage facilities	48.03	V
6	Low productivity	39.97	VI
7	Non availability of quality seed	38.13	VII
8	Inadequate market information	37.70	VIII
9	Less government priority	33.70	IX

Constraints faced by the traders in the study area

Table 3.9: Constraints faced by traders (n=20)

Sl. No.	Constraints	Garrett score	Rank
1	Price fluctuation	70.73	I
2	Mismatch demand and supply	58.27	II
3	High marketing cost	41.16	IV
4	Storage	29.83	III

Constraints faced by the KASAM in the study area

KASAM, the exporting company faces various problems in the study area. The main problem faced by it was fulfilling the criteria of certification, because other farmers apply fertilizer and pesticide in the nearby plot which is a hurdle for them the other problems faced by KASAM was listed below with their rank.

Table 3.10: Constraints faced by KASAM

Sl. No.	Constraints	Rank
1	Application of pesticide and fertilizer by others	I
2	Connectivity problem	II
3	Incoherent Government policy	III
4	Lack of more Processing unit	IV
5	Dominance of local trader	V
6	Lack of quality man power	VI

4. Summary and Conclusion

Turmeric is one of the most important spice crops grown in Kandhamal district; however the productivity is continuously decreasing year by year. Thus, there is need to increase the productivity to fulfill the domestic requirement and for export. Turmeric cultivation is capital intensive and needs more investment. It has been observed that technological interventions like rhizome treatment, soil application of bio control agent, crop rotation, mulching, and plant protection measures increased rhizomes yield by 20- 25per cent at farmer's field and with the application of irrigation, yield increased by 20-30 percent, but the farmers are not applying irrigation to the crop. To enhance the productivity, ecofriendly production technologies among the farming community are the need of the hour. The indigenous technical knowledge acquired by the farmers need to be tested and refined with the modern techniques of crop cultivation.

The overall value chain study of turmeric in Kandhamal district revealed that attention should be paid in introduction of appropriate variety, quality of seed, irrigation requirement, input like organic manure, bio fertilizer and scientific drying and processing methods, post-harvest management, value addition and access to finance and There is a need to establish the e-tendering system for marketing of turmeric, since it is more transparent There exist very divergent interest areas in terms of actors in both production side and market side. The production side actors are typically interested in access to capital, market assurances (price and quantity), and highest prices from the market actors. While, the market actors expect shared risks and inputs, quality and quantity assurances and market-led price fixing from the production side actors.

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