



## Value Chain Analysis of Turmeric in Northern Karnataka, India

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Author VN designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SBH supervised and guided each step, edited and proof read the manuscript. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

The present study is an attempt to assess the economics of production, farm level processing and to identify and evaluate the different marketing channels which are involved in the marketing of turmeric in Northern Karnataka. For the study, 96 farmers practicing the cultivation of turmeric in both Bagalkot and Belagavi district were selected randomly. The data collected from the respondents was analysed using budgeting technique. The data pertained to the 2011-12 agriculture year. The estimated per acre cost of cultivation was more in the case of Belagavi district than that of Bagalkot district whereas, the gross returns and total marketing costs were higher in the case of Bagalkot district. The B: C ratio was found to be profitable in both the districts. With respect to marketing cost incurred by the market intermediaries, it was more in the case of wholesalers. Results of the marketing efficiency showed that, channel-III was the most efficient marketing channel, thus selling of turmeric to the processors through commission agents/traders was said to be an efficient marketing channel.

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## 1. INTRODUCTION

India is popularly known as the “Spice Bowl of the World” as a wide variety of spices with premium quality are grown in the country since ancient times. In Vedas, as early as 6000 BC, scrupulous evidences are available regarding various spices, their properties and utility [1]. Among the commodities that were traded during that period, spices occupied a major portion due to their superior quality and diversity which attracted foreigners to India. Turmeric is also called as Golden Spice — is widely cultivated in different countries such as India, China, Myanmar, Nigeria, Bangladesh, Pakistan, Sri Lanka, Taiwan, Burma, Indonesia, etc. Among these countries, India occupies first position in both areas (233 thousand hectares) and production (1190 thousand tonnes) of turmeric during 2013-14 (*Indian Horticulture Database-2014*). In India, turmeric is grown in 18 states and Andhra Pradesh, Tamil Nadu, Karnataka, Orissa and West Bengal are the major turmeric-producing states. Karnataka is the third largest producer of turmeric in India after Andhra Pradesh and Tamil Nadu with an area of 24912 ha and with production of 250829 tonnes in 2010-11 with a share of 8.5 per cent to the India's total production. In Karnataka, the major districts which are producing turmeric are Chamarajanagar, Mysore, Bagalkot, Belagavi and Bidar. Chamarajanagar is the leading district with an area of about 9708 ha with a production of 50808 tonnes followed by Mysore (6389 ha and 100310 tonnes), Bagalkot (4161 ha and 62898 tonnes) and Belagavi (1695 ha and 10352 tonnes). It is widely grown and consumed spice in the world and has got good international market. Prices of turmeric show considerable volatility that could pose profit risk to different stakeholders. During 2012-13, the price of the turmeric has steadily fell down to around ₹ 5565 per quintal from ₹ 17,000 per quintal mark during 2010-11, due to increased acreage under turmeric mainly in Gobichettypalayam, Kodumudi and Bannari regions of Tamil Nadu State. Due to this, the Government of India announced the minimum support price for turmeric during May 2012 to safeguard the interest of the turmeric growers against further fall in the price of turmeric. Central government announced ₹ 4, 092 per quintal for polished turmeric and in addition to that the Karnataka state government announced additional amount of ₹ 908 per

quintal. Thus the government purchased turmeric at the price of ₹ 5000 per quintal.

A large group of market participants are engaged in different activity in the entire value chain of turmeric right from production to its consumption and due to high marketing cost involved in the marketing, it reinforces the need for risk management tool. Keeping in view the above points, present study is a modest attempt to analyse the production, farm level processing and marketing of turmeric in Northern Karnataka. The study will also help the planners and policy makers to frame appropriate policies related to the turmeric production and marketing.

## 2. MATERIALS AND METHODS

Multi stage sampling technique was employed for selection of districts, taluks and villages. The present study was conducted in Bagalkot and Belagavi districts of Northern Karnataka as these two districts were having highest area under turmeric in Northern Karnataka. In the second stage two taluks from each district were selected based on the highest area under turmeric. Thus Jamakandi and Mudhol taluks in Bagalkot district and Gokak and Raibag taluks in Belagavi district were topped the list and were selected for the study. In the third stage two villages from each taluk were selected again based on the area under turmeric. For the selection of sample farmers, random sampling method was adopted and from each village twelve farmers practicing the cultivation of turmeric were selected randomly, thus the total sample size of the respondents was 96. For the selection of market intermediaries purposive sampling technique was adopted i.e., Sangli Market was selected as the majority of the turmeric growers of the region were used to sell their produce in Sangli market. For studying the marketing aspects of turmeric five retailers, five wholesalers and five commission agents/traders were selected randomly in the market and the total sample size of the market intermediaries was 15.

The collected data were presented in tabular form to facilitate easy comparisons. The budgeting technique was employed for estimating the cost and return structure and tabular presentation technique was employed to analyse the marketing cost and margins under different channels of turmeric marketing, the data were summarized with the aid of statistical tools

like averages and percentages to obtain the meaningful results. To analyse the producer's share in the consumer's rupee and marketing efficiency following formulas were used,

### 2.1 Producer's Share in the Consumer's Rupee (PSCR)

Producer's net price (PNP) expressed as a percentage of the retail price (RP) is defined as producer's share in the consumer's rupee.

$$PSCR = (PNP / RP) \times 100$$

### 2.2 Marketing Efficiency

The marketing efficiency was estimated by using Shephard's formula [2],

$$ME = (V/I) - 1$$

Where,

ME= Index of marketing efficiency

V= Consumer price

I= Total marketing cost

## 3. RESULTS AND DISCUSSION

### 3.1 Cost of Cultivation of Turmeric

The detail per acre cost of cultivation of turmeric in both the districts is presented in the Table 1. Perusal of the table indicated that, in both the districts variable costs accounted for a major share in the total cost of cultivation. The variable costs mainly comprised of cost of human labour, bullock labour, planting material, FYM, fertilizers and plant protection chemicals.

It is evident from the table that, per acre average cost of cultivation of turmeric was high in the case of Belagavi district (₹ 83402) than Bagalkot district (₹ 82948) in that, the total variable cost was ₹ 78224, ₹ 78192 respectively, among the variable costs, cost of planting material, cost of human labour and cost of FYM were the major items in both the districts. The expenditure on the planting material found to be an important item in the total cost of cultivation of turmeric since seed material had to be properly processed by way of seed treatment. The cost on seed material can be reduced if the farmers would have known the technique of preserving their own seed material in better way. As turmeric is vegetatively propagated crop, the healthy mother rhizomes can be used for planting in the next season by proper treatment and preservation. The growers expressed their fear about decreasing crop stand and gradual decreased in yield, year after year.

The turmeric is more labour intensive crop which requires semi-skilled labour from planting to till harvesting and also the farmers used more quantity of FYM to improve the soil fertility and to get more yield since there is a better spread of younger rhizomes in the fertile soils, which the farmers aware of [3]. The cost involved in the usage of human labour was high in the case of Bagalkot district (₹ 17677) than that of Belagavi district (₹ 16507) due to more wage rate prevailing in the Bagalkot district. The results of the study are in line with the study conducted by [4].

Among the items of fixed costs, the rental value of land had a maximum share in the total cost of cultivation followed by depreciation charges, interest on fixed capital and land revenue in case of both the districts.

### 3.2 Cost of Farm Level Processing of Turmeric

Harvesting of turmeric is carried out during January to March since the temperature during summer season helps in curing the crop. The curing percentage of turmeric was 20 to 22 per cent in the study area. The turmeric crop is harvested in the form of wet rhizomes which are not used for the direct consumption. It needs certain kind of farm level processing. Farm level processing starts from separation of fingers from rhizomes. It consists of curing, drying and polishing of cooked fingers. The detailed per acre cost of farm level processing of turmeric is presented in Table 2.

It could be seen from the table that, per acre total cost of farm level processing of turmeric in Bagalkot district was ₹ 12531, in that the curing operation required ₹ 1553 of human labour, ₹ 3650 of machine labour and ₹ 292 of wood as a fuel. The drying operation required ₹ 1272 of human labour and ₹ 1486 for the purchase of utensils. Finally for the polishing operation, the farmers spent ₹ 1820 on human labour and ₹ 2458 on machine labour. Similarly in Belagavi district, the total cost of processing was ₹ 11123 per acre. On an average the sample farmers spent ₹ 1667 on human labour, ₹ 3266 on machine labour and ₹ 220 on wood while curing of wet rhizomes. For drying of cooked rhizomes the sample farmers spent ₹ 1165 on human labour and ₹ 1108 for the purchase of utensils and for polishing the sample farmers spent ₹ 1679 on human labour and ₹ 2018 on machine labour.

**Table 1. Cost of cultivation and yield of turmeric in Northern Karnataka**

Sl. no.	Particulars	Districts			
		Bagalkot	Per cent	Belagavi	Per cent
(₹/acre)					
<b>I. Variable cost</b>					
1	Human labour	17677	21.31	16507	19.79
2	Bullock labour	1842	2.22	1594	1.91
3	Machine labour	4938	5.95	5312	6.37
4	Planting material	34031	41.03	35564	42.64
5	Farm yard manure	10003	12.06	8793	10.54
6	Fertilizers	2025	2.44	2259	2.71
7	PPC	2561	3.09	3078	3.69
8	Interest on working capital	5115	6.17	5117	6.14
	<b>Subtotal (I)</b>	<b>78192</b>	<b>94.27</b>	<b>78224</b>	<b>93.79</b>
<b>II. Fixed cost</b>					
1	Rental value of land	3250	3.92	3750	4.50
2	Land revenue	15.00	0.02	25	0.03
3	Depreciation	1020	1.23	890	1.07
4	Interest on fixed capital	471	0.57	513	0.62
	<b>Subtotal (II)</b>	<b>4756</b>	<b>5.73</b>	<b>5178</b>	<b>6.21</b>
<b>Total cost of cultivation (I)+ (II)</b>		<b>82948</b>	<b>100.00</b>	<b>83402</b>	<b>100.00</b>

**Table 2. Cost of processing of turmeric in Northern Karnataka**

Sl. no	Particulars	Districts	
		Bagalkot	Belagavi
(₹/acre)			
<b>I</b>	<b>Curing</b>		
1	Human labour	1553	1667
2	Machine labour	3650	3266
3.	Wood	292	220
<b>II</b>	<b>Drying</b>		
1	Human labour	1272	1165
2	Utensils	1486	1108
<b>III</b>	<b>Polishing</b>		
1	Human labour	1820	1679
2	Machine labour	2458	2018
<b>IV</b>	<b>Total</b>	<b>12531</b>	<b>11123</b>

The total cost of processing of turmeric was found to be high in the case of Bagalkot district (₹ 12531) than Belagavi district, this marginal difference was mainly due to the difference in the hiring charges of the machines for processing. In the study area, for curing operation the sample farmers incurred more cost on machine labour which was more in the case of Bagalkot district. It was noticed that in the study area, majority of the farmers were practicing the scientific method and TNAU (Tamil Nadu Agricultural University) method for curing of turmeric as these methods required considerably less time as compared to the traditional method and moreover, these improved techniques also helped in perfect boiling of turmeric which turn influenced the

colour and aroma of the final product. For fuel to cook the rhizomes, farmers used vegetative waste from mulberry sticks, dried coconut leaves, sugarcane thrash, cotton sticks available on the farm and some of the sample farmers purchased the fuel wood for boiling purpose from other sources that is about 2.5 to 3 quintal of fuel wood was required to cook one acre rhizomes.

The cooked fingers are dried in the sun by spreading them in five to seven cm thick layers on low quality sarees or drying floor. A thinner layer is not desirable, as the colour of the dried product may be adversely affected. During night time, the rhizomes were heaped or covered with material which provides aeration. It may take 10-15 days for the rhizomes to become completely dry. In drying operation farmers incurred more cost on human labour as it is 10-15 days process and to some extent on purchase of sarees and drying nets which are required for drying mainly low quality sarees and drying nets, these sarees costs around ₹ 8 to 10 each and around 100 to 120 sarees were required to dry one acre of cooked rhizomes.

Dried turmeric has a poor appearance and a rough dull outer surface with scales and root bits. The appearance is improved by smoothening and polishing the outer surface by mechanical rubbing. In the study area the dried turmeric are polished on the farm by hiring a power/manual operated rotary drum. The cost of hiring of machine for polishing of turmeric was high in the

case of Bagalkot district; this was mainly due to difference in the hiring charges of the machines. The results of the study are in line with that of [5].

### 3.3 Cost and Returns Profile of Turmeric Production

The details of per acre costs and returns structure in turmeric production in the selected districts are presented in Table 3. Perusal of the table revealed that, the total cost of cultivation was found high in the case of Belagavi district (₹ 83402) than that of Bagalkot district, cost of processing and marketing were found high in the case of Bagalkot district (₹ 12531 and ₹ 8006) than Belagavi district (₹11123 and ₹ 7984). The returns obtained from the main produce and By-produce (fingers) were high in the case of Bagalkot district (₹ 142885 and ₹ 59144) than that of Belagavi district (₹ 122017 and ₹ 53082). The B: C ratio was found to be profitable in both the districts. In spite of huge variable costs involved in turmeric cultivation, returns were quite good which can further be increased by efficient management of the farm. The findings of the above analysis are in line with the results of [6,7,8].

**Table 3. Cost and returns profile of turmeric production in Northern Karnataka**

Sl. no.	Particulars	Districts	
		Bagalkot	Belagavi
		(₹/acre)	
1	Total cost of cultivation	82949	83402
2	Total cost of processing	12531	11123
3	Total cost of marketing	8006	7984
4	Price (₹/qtl)	5131	4764
5	Returns from main produce	142885	122017
6	Returns from the by-produce	59144	53082
7	Gross returns	202029	175099
8	Net return	98543	72590
9	B:C ratio	1.96	1.71

### 3.4 Marketing Performance of Turmeric

In the marketing of turmeric three marketing channels were in the study area and they were as follows. Producer → Commission agents/traders → Wholesalers → Retailers → Consumer, Producer → TAPCMS (Taluk

Agricultural Produce Co-operative Marketing Society Ltd.,) and Producer → Commission agents/traders → Processors. The second channel introduced by the government mainly because of crash in the prices of turmeric in the state during May 2012-13 through market intervention scheme. Per quintal cost incurred by sample farmers in marketing of the turmeric through channel-I and II has been narrated in Table 4. The marketing cost incurred varied from market to market and channel to channel.

It could be seen from the table that, the per quintal marketing cost incurred by the sample farmers in channel-I was high in the case of Bagalkot district (₹ 387) than Belagavi district (₹ 360). Apart from this transportation cost was another important item of cost and it was more in the case of Bagalkot district (₹ 98) than Belagavi district (₹ 83) since the farmers of these two districts use to sell their produce in Sangli market of Maharashtra. In channel-II, the total marketing cost incurred by the sample farmers was high in the case of Belagavi district (₹ 195/quintal). In this channel major items of cost were transportation cost and packing cost. In Belagavi district the farmers of Raibag taluk sold the produce in nearby taluk i.e., Gokak TAPCMS as in Raibag TAPCMS there was no facility of trading. Similar findings were obtained by [9].

The total marketing costs incurred by the commission agents/traders were more in the case of Bagalkot district (₹ 350/quintal) than Belagavi district (Table 5). The major cost items were storage loss, tax and packing charges. The storage loss accounts more in the total cost as the commission agents/traders will lose 2- 3 per cent of the produce while handling the produce as opined by the commission agents/traders. The marketing cost of the wholesalers (₹ 426) and retailers (₹ 358) in both the districts were same as all the sample farmers sold the produce in Sangli market and also same wholesalers were considered for eliciting the required information (Tables 6 and 7).

Marketing margins and their components under different channels of marketing have been presented in Table 8. Marketing margins measured the gap between the net price received by the producer and the ultimate price paid by the consumer. From the view point of marketing efficiency, this gap has to be reduced to the minimum.

Table 4. Marketing cost incurred by the farmers in channel-I and II

S.N.	Item of cost	Districts			
		Bagalkot		Belagavi	
		Amount (₹)	Per cent	Amount (₹)	Per cent
(₹/qtl.)					
<b>Producer – Commission agents/traders</b>					
1	Cleaning/sorting	43	11.11	55	15.28
2	Packing	48	12.40	45	12.50
3	Transportation	98	25.32	83	23.06
4	Weighment	5	1.29	5	1.39
5	Commission charges	157	40.57	141	39.17
6	Storage	-	-	-	-
7	Loading and unloading	26	6.72	19	5.28
8	Miscellaneous	10	2.58	12	3.33
	<b>Total</b>	<b>387</b>	<b>100</b>	<b>360</b>	<b>100</b>
<b>Producer-TAPCMS</b>					
1	Cleaning/sorting	44	25.00	51	26.15
2	Packing	47	26.70	47	24.10
3	Transportation	52	29.55	75	38.46
4	Weighment	-	-	-	-
5	Commission charges	-	-	-	-
6	Storage	-	-	-	-
7	Loading and unloading	26	14.77	14	7.18
8	Miscellaneous	7	3.98	8	4.10
	<b>Total</b>	<b>176</b>	<b>100</b>	<b>195</b>	<b>100</b>

Table 5. Marketing cost incurred by the commission agents/traders in Northern Karnataka

Sl. no.	Item of cost	Districts			
		Bagalkot		Belagavi	
		Amount (₹)	Per cent	Amount (₹)	Per cent
(₹/qtl.)					
1	Packing	44	12.52	44	12.89
2	Market fee	11	3.13	11	3.22
3	Tax	98	27.97	98	28.79
4	Storage loss	105	29.86	94	27.61
5	Labour cost	34	9.75	34	10.04
6	Shop rent	23	6.52	23	6.71
7	Miscellaneous cost	36	10.35	36	10.66
	<b>Total cost</b>	<b>350</b>	<b>100</b>	<b>340</b>	<b>100</b>

Table 6. Marketing cost incurred by the wholesalers in Northern Karnataka

Sl. no.	Item of cost	Districts			
		Bagalkot		Belagavi	
		Amount (₹)	Per cent	Amount (₹)	Per cent
(₹/qtl.)					
1	Packing	43	10.09	43	10.09
2	Market fee	12	2.82	12	2.82
3	Tax	113	26.53	113	26.53
4	Storage loss	164	38.50	164	38.50
5	Labour cost	33	7.75	33	7.75
6	Shop rent	26	6.10	26	6.10
7	Miscellaneous cost	35	8.22	35	8.22
	<b>Total cost</b>	<b>426</b>	<b>100</b>	<b>426</b>	<b>100</b>

**Table 7. Marketing cost incurred by the retailers in Northern Karnataka**

Sl. no.	Item of cost	Districts			
		Bagalkot		Belagavi	
		Amount (₹)	Per cent	Amount (₹)	Per cent
1	Packing	40	11.17	40	11.17
2	Transportation	38	10.61	38	10.61
3	Loading and unloading	21	5.87	21	5.87
4	Storage loss	226	63.13	226	63.13
5	Municipality charges	10	2.79	10	2.79
6	Miscellaneous cost	23	6.42	23	6.42
	<b>Total cost</b>	<b>358</b>	<b>100</b>	<b>358</b>	<b>100</b>

**Table 8. Costs and margins in different channels of turmeric marketing in Northern Karnataka**

Sl. No	Particulars	Districts	
		Bagalkot	Belagavi
<b>Channel –I</b>			
1.	Gross Price received by the producer	5225	4640
2.	Marketing cost of producer	387	359
3.	Net price received by producer	4838	4280
4.	Cost incurred by the commission agent	350	340
5.	Profit of the commission agent	950	1546
6.	Price paid by the wholesaler	6525	6525
7.	Cost incurred by the wholesaler	427	427
8.	Profit of the wholesaler	574	574
9.	Price paid by the retailer	7526	7526
10.	Cost of the retailer	358	358
11.	Profit of the retailer	816	816
12.	Consumer purchase price	8700	8700
13.	Marketing Margin/price spread	3475	4061
14.	Producer's share in consumer rupee (%)	55.60	49.20
15.	Marketing efficiency	4.71	4.86
<b>Channel –III</b>			
1	Net price received by producer	4838	4280
2	Marketing cost of producer	387	359
3	Price paid by the commission agent	5225	4640
4	Cost incurred by the commission agent	350	340
5	Price paid by the processor	6525	6525
6	Producer's share in processors rupee (%)	74.14	65.60
7	Marketing efficiency	7.84	8.34

A clear perusal of the table revealed that the producer's share in consumer/processor rupee in both the districts was more in case of channel-III (74.14% and 65.60%) than channel-I, due to presence of more number of additional market intermediaries in channel-I. Producer's share in processors purchase price was fairly better in both the selected districts under channel-III i.e. highest was observed in Bagalkot district (74.14%) than Belagavi district (65.60%) and similarly in the case of channel-I also. The marketing efficiency of different channels of turmeric has been worked out by Shephard's

formula and it is shown in the same table. A perusal of the table reveals that channel-III was the most efficient marketing channel as efficiency index was high in both the districts than that of channel-I. The index was found high in the case of Belagavi district in case of both the channels. Thus Selling to the processors through commission agents/traders is said to be efficient marketing channel. [10] also concluded in their study that, Producer → Processors channel was more efficient in the marketing of Red Chillies in Andhra Pradesh as in this channel more value goods were delivered to consumer from producer

at low marketing costs. The results of the study are in line with the findings of [6] where they identified the marketing channels for turmeric in Punjab, they found that Producer–Processor–Consumer (channel I) has been found to be the major marketing channel by which nearly 72 per cent of the turmeric is sold. In that channel, the relative share of net price received by producer in the consumer rupee has been found as 15.46 per cent, while net margin of processor has been noted as 34.10 per cent. Similar results were obtained by [11,12].

#### 4. CONCLUSION

In spite of huge variable costs involved in turmeric cultivation, returns were quite good and hence, the farmers need to be encouraged to take up the cultivation of this crop in large areas with a provision of financial assistance by the institutional agencies at subsidized rate of interest. Producer's share in consumer/processor rupee was more in channel-III and thus there is a need to develop processing industry in the production area to enable the farmers to get remunerative price for their produce. The government may also take up the serious steps to encourage both farmers and traders for trading of the commodity in the local regulated markets by providing the infrastructural facility such as scientific storage and transport facilities besides disseminating information on international markets, price behavior and other trade matters.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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