Supply Chain Management of Ginger in Meghalaya- Empirical Analysis

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ABSTRACT

The NE states of India are the major contributor of ginger production in the country. Among the states in NER, Meghalaya is the highest ginger producing states. A majority of the ginger producers in the state are resource poor and lack in storage facilities which compelled them to dispose-off their produce to wholesalers immediately after harvest when the price is at the lowest. Moreover, market price fluctuations over the years have negatively affected the ginger producers. Hence, study was conducted in the state of Meghalaya by selecting 103 ginger growers from West Garo hill and Ri-bhoi district to analyse the supply chain of ginger. The statandard analytical tools were applied to analyse the data. The study found that the price received by the ginger grower was highest in case where farmers sell the produce directly to the consumer but in reality it is not practical as the crop is perishable in nature and every farmer cannot do. The farmers sold bulk quantity of the produce either to Village Merchant or Wholesalers. Therefore, study recommends regulation on marketing costs and margin for actors in the chain. The perishable product and bulky in nature requires warehouse facility for proper storage such as cold storage facilities as well as mode of transportation from farmers' farm. Establishment of processing units for the management of surplus ginger to enhance the due share of ginger grower in consumers' price was the need of hours

Key words: *Supply Chain; Ginger; Meghalaya; Management;*

Ginger, one of the earliest known oriental spice cultivated in the country is an aromatic perennial rhizome botanically known as *Zingiber officinale,* India is not only the larger producer but also the major consumer and exporter of spices in the world (*FAOSTAT, 2015*). About 24.38 per cent of spices has been exported from India during 2013-14 fetching an income of Rs.116238.22 crore (2482.82$) (*Spices board of India, 2018*). Among the major spices grown, ginger ranked 6th in area and 4th in production during 2015. It contributes about 30 per cent of total global production followed by China, Nepal, Indonesia, Nigeria, and Thailand. A total of 1047.19 MT of ginger was produced in the country during 2016-17. Assam was the leading spice producing state in the country followed by West Bengal and Maharashtra (*Spice Board of India, 2018*).

The NE part of India is also one of the major contributors of ginger production in the country. In these hilly terrains of NEH region, ginger is usually cultivated in raised beds or in the *Jhum* field. The most prevalent system of cultivation are *Jhum* method, *Bun* method in Meghalaya, *Zabo* method in Nagaland and *Tila* method in Tripura and along the terrace in Sikkim (*Rahman et al., 2009*). A noteworthy feature of the ginger produced in NE state is high oil content (1.6-2.5%) and high oleoresin content (5.9-8.5 %) (*Rahman et. al., 2009*). NE state alone produces 37.94 per cent (438.48 thousand MT) of ginger in India from 39.53 per cent of the total cultivated area during 2015-16 which are marketed as fresh product. The productivity was also high (7.06 t/ha) against the national average of 6.78t/ha (*GoI, 2017*). The leading producers of ginger in the region are Assam contributing 37.20 per cent followed by Meghalaya (14.92%) and Arunachal Pradesh (12.90%) while the

least producer is Manipur (0.88%) (*GoI, 2017*).

Meghalaya has a total number of population (2011 census) 29.66 lakhs, out of which 0.56 lakhs of the population were engaged in public sector. Private sector engaged 0.07 lakhs and the remaining of the population were engaged in other activities and agriculture sector contributes as one of the main sector in generating employment for the population of the state (*GoM, 2017*). Agriculture and allied sector contribute 17.38 per cent to the Gross State Domestic Product (GSDP) of Meghalaya at current price during 2011-12 (*GoI, 2015*). Agriculture provides food, income, and jobs, and can be an engine of growth in agriculture-based developing countries and an effective tool to reduce poverty (*Alderman, 2007*). Total spices production in Meghalaya during 2015-16 was estimated to be 97.82 thousand metric tonnes and ginger alone contributed 65.43 thousand metric tonnes (*GoM, 2016*). Among the states in NER, Meghalaya is the highest ginger producing states with the production of 65.43 thousand MT followed by Arunachal Pradesh 56.58 thousand MT and Nagaland 55.23 thousand MT (*GoI, 2017*).

The traditional method of cultivation, huge marketable surplus and lack of marketing intervention hinder the potential of NEH region as a major producer of ginger in the country (*Kithu, 2003*). A majority of the ginger producers in this region are resource poor and lack storage facilities which compelled them to sell off their produce to wholesalers immediately after harvest when the price is at the lowest (*Rahman et al., 2009*). Moreover, market price fluctuations over the years have negatively affected the ginger producers. Thus, there is a need to organize producers cooperative to integrate their production, processing and marketing activity (*Datta et al., 2003*) and the need to stress on commodity and community base processing centres (*Shruti et. al. 2019*). With this background, the following objectives were proposed for the study:

i.   Costs and returns from ginger cultivation.

ii. Characterization and mapping of value chain actors of selected commodity and

iii. Estimation of compliance cost, investment and margins along value chains of selected commodities.

METHODOLOGY

The present study has been carried out in Meghalaya under ICAR, New Delhi funded project titled "Policy Imperative for Promoting Value Chains of Organically produced major spices in North Eastern Hill Region". Two district namely Ri-Bhoi and West Garo Hills districts from Meghalaya has been selected purposively. Two block/ collection centre/ market where farmers disposed their produced *i.e.* Bhoirymbong and Umsning from Ri-Bhoi and Rongram and Dadengiri from West Garo Hills had been selected purposively. A cluster of adjacent villages (situated within 10 km radius from collection centre) have been selected at 10 per cent of the total ginger growers in that particular selected village. Thus a total of 103 respondent farmers had been selected. Value chain actors involved at various stages of value chains were mapped to examine the gains in value of the commodities as it moves from one chain actor to another chain actor. As processing of ginger in the study area was not practiced so the prevalent actors involved in the chains were mostly Village Merchant (4), Wholesalers (11) and Retailers (4), Traders in marketing of the produce from farmers to the end user *i.e.* consumers.

Both primary and secondary data were collected. Primary household data were collected using the pre-tested well structured schedule during the crop year of 2017-2018. Marketing aspect (marketing costs and margins) and value added of crop at different level of production through processing and marketing were collected. Secondary data on area and production were collected from the various publications of the Directorate of Statistics & Economics, Agriculture and Horticulture of the state.

Analytical techniques

Cost and return in ginger cultivation : To study the costs and returns from selected ginger growers cost concepts (Sen and Bhatia, 2004) and break-even analysis was carried out.

Mapping of the value chain actors : Value chain analysis study helps to map the value chain of a specific product involving various value chain actors, which may use qualitative or quantitative approach. While the produce moves from one chain actor to another chain actor, it gains value in the form of price mark-up. The chain actors, who actually transact a particular product as it moves through the value chain, includes input dealers (e.g., seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and final consumer were listed and mapped accordingly. The agencies that

have been supporting the chain directly or indirectly were listed as enablers/ supporters. The definition of each actor, flow of products within the chain and the relationship between various actors are presented with the help of value chain maps.

Estimation of compliance cost : To study the existing production and marketing system, marketing cost and margins or investment incurred by value chain actors at different level of production through processing and marketing was estimated and two to three actors involved at each stage of value chain were selected.

Cost or Investment along the value chain : The total cost incurred on processing or marketing either in cash or in kind by the producer seller and by various actors involved in the sale and purchase of commodities till the commodities reaches the ultimate consumer, it is computed as:

$$C = C_F + C_{m1} + C_{m2} + C_{m3} + \ldots + C_{mi}$$
$$C = C_F + ÓC_{mi}$$

Where,

C =   Total cost of marketing of the commodity

C_F =   Cost paid by the producer at the time the producer leaves the farm till he sells it

C_{mi} =   Cost incurred by the various actors in the process of buying and selling the product.

Margin along the value chain by various actors : It is the difference between the total payments (cost + purchase price) and receipts (sale price) of the actors (i[th] agency). It is expressed as:

$$A_{mi} = P_{ri} - (P_{pi} + C_{mi})$$

Where,

A_{mi} =   Absolute marketing margin of various actors

P_{ri} =   Total value of receipts per unit (sale price)

P_{pi} =   Purchased value per unit (purchased price)

C_{mi} =   Cost incurred on marketing per unit

Price spread : It is the difference between the price paid by consumer and the price received by the producer for an equivalent quantity of farm produce. It was calculated by using the following formula.

$$Price\ spread = P_c - P_f$$

Where,

P_c =   Price paid by consumer

P_f =   Price received by the producer

RESULTS AND DISCUSSION

Costs and returns of ginger cultivation in NE hill region : Ginger cultivation in the study area was mainly done using human labour. Human labours generally engaged more by family labour and less by hired labour and male labour involved more mandays as compare to female labour in most of the activities.

Establishment cost : The establishment cost of cultivation of ginger includes Land preparation, sowing, planting material (rhizome) and manure Table 1. Among the establishment cost of cultivation the cost on planting material (rhizome) accounted for a major share with Rs. 26670.09/ ha (59.95%) which is followed by land preparation (20.23%), sowing (13.68%) and manure (6.14%).

Maintenance cost : Maintenance cost includes weeding & earthing up and harvesting (Table 1). Among the maintenance cost of cultivation, the cost on weeding accounted for a major share with Rs. 12766/ ha (55.75%) which is followed by harvesting with Rs. 10132.40/ ha (20.23%).

Table 1. Establishment and maintenance cost in ginger cultivation in Meghalaya

Particular	Rs. /ha	%
Establishment cost		
Land preparation	9000.00	20.23
Sowing	6085.20	13.68
Planting material (rhizome)	26670.17	59.95
Manure	2733.09	6.14
Total	44488.46	100.00
Maintenance cost		
Weeding & Earthing up	12766.00	55.75
Harvesting	10132.40	44.25
Total	22898.40	100.00

Cost concepts: Per hectare cost of cultivation of ginger in the study area was worked out to be Rs. 77360.61. Per hectare average yield of ginger in the study area was estimated of 3.80 MT from which the farmers earned the gross income of Rs. 114310.30 and net income of Rs. 36949.69 per hectare. The break-even-point (BEP) was estimated to be at 0.62 ton in Meghalaya. Family level income was estimated to be of Rs. 66853.69 per ha. by the cost of planting materials (Table 2).

Compliance cost in value chains of ginger

Producers' surplus of ginger : Production of ginger in household level was estimated to be of 13.67 quintal in Meghalaya. About 26.55 per cent of the produce was used as seed for the next season, 6.73 per cent was loss in the farmers' field and with less quantity of 0.37 per cent were used for consumption purposes. The farming community was able to keep 66.53 per cent as marketed

Table 2. Costs and returns of ginger cultivation in Meghalaya

Cost items	Ri-Bhoi Amount (Rs/ha)	West Garo Hills Amount (Rs/ha)	Overall Amount (Rs/ha)
Cost-A_1	42162.87	47527.35	40671.39
Cost-A_2	44813.50	47527.35	42300.06
Cost-B_1	44813.50	47527.35	42300.06
Cost-B_2	49265.58	43705.92	47456.61
Cost-C_1	76505.50	64061.35	72204.06
Cost-C_2	80957.58	70239.92	77360.61
Yield (MT/ha)	3.33	4.38	3.8
Break-even-point (ton)	0.82	0.47	0.62
Gross farm income (GFI)	103466.38	125660.21	114210.30
Farm business income (GFI - CostA_2)	58652.88	88132.86	72010.24
Family level income (GFI - CostB_2)	54200.80	81954.29	66853.69
Net farm income (GFI - CostC_2)	22508.80	55420.29	36949.69
Farm investment income (Farm business income-wages of family labour)	26960.88	61598.86	42106.24

surplus in (Table 3). Hence, study found the ginger grower in Meghalaya as resourceful and no distress sale was reported till date in the state.

Table 3. Marketable and marketed surplus of ginger in Meghalaya

Particular	Quintal	%
Total production	13.67	100.00
a) Consumption	0.05	0.37
b) Used as seed	3.63	26.55
c) Loss at farmers field	0.92	6.73
Total requirement (a+b+c)	4.60	33.65
Marketable surplus	9.99	73.08
Marketed surplus	9.07	66.35

Figure in parentheses is percentage to total production

Table 4. Disposal pattern of ginger in Meghalaya

Channel	%
Channel-I: (P $\rightarrow$ VM $\rightarrow$ W $\rightarrow$ Tr)	23.81
Channel-II: (P $\rightarrow$ W $\rightarrow$ Tr)	68.30
Channel-III: (P $\rightarrow$ R $\rightarrow$ C)	4.93
Channel-IV: (P $\rightarrow$ C)	2.96
Total	100.00

Note: P- Producer; VM- Village Merchant; W- Wholesaler; Tr- Trader; R- Retailer; C- Cons*umer*

Disposal Channels of ginger identified : The state wise identified channels and disposed quantity is presented in Table 4. Four channels were identified in marketing of ginger in Meghalaya *viz.* Channel-I (Producer- Village Merchant- Wholesaler- Trader), Channel-II (Producer- Wholesaler- Trader), Channel-III (Producer- Retailer-

Consumer) and Channel-IV (Producer- Consumer). The maximum quantum of raw ginger has been disposed through Channel-II (68.30%) which was followed by the Channel-I (23.81%). Rest of the quantity of ginger was disposed through Channel-III (4.93%) and Channel-IV (2.96%).

Marketing cost incurred and margin earned by the intermediaries along the supply chain in Meghalaya has been presented in Table 5.

In Channel-I, the harvested produce was purchased directly from the farmers by the village merchant (Rs. 2716.67) and per quintal marketing cost incurred by village merchant has been estimated at Rs. 243.34 per quintal. Transportation cost was the major cost incurred by the village merchant in the study area (26.97%). The selling price of village merchant was accounted of Rs. 3308.33 per quintal and marketing margin realized of Rs. 348.32. The product then passes to the wholesaler and cost incurred by wholesaler was accounted of Rs. 186.83 per quintal in which more than 36 per cent of cost was incurred on losses during storage. The selling price of wholesaler was recorded as Rs. 4144.44 per quintal and the marketing margin earned by wholesaler was observed to be of Rs. 649.28 per quintal. Then the products are transported by the traders outside the state to Kolkata.

In Channel-II, the farmers sell their produce to the wholesaler (Rs. 2982.67/ qtl) in the collection centre or sometimes the wholesalers collect the produce from farmers in their respective villages. The total marketing

Table 5. Marketing cost, margin and price spread of ginger in Meghalaya (Rs/qtl)

Particular	Channel I	Channel II	Channel III	Channel IV
Selling price of producer	2716.67	2982.67	3030	3340
Cost incurred by producer				
Transportation	-	51.12(12.77)	-	81.25(41.94)
Loading & unloading	-	24.42(6.10)	-	31.25(16.13)
Weighing	-	8.71(2.18)	-	-
Gunny bags/pack	-	36.35(9.08)	-	-
Deduction/ Loss	-	222.08(55.49)	-	-
Loss during marketing	-	5.12(1.28)	-	-
Sorting and Grading	-	33.03(8.25)	-	43.75(22.58)
Washing & Cleaning	-	19.4(4.85)	-	37.5(19.35)
Total (i to viii)	-	400.23(100.0)	-	193.75(100.0)
Net price receive by producer	2716.67	2582.44	3030	3146.25
Cost incurred by Village Merchant				
Transportation	65.63(26.97)	-	-	-
Loading & unloading	28.13(11.56)	-	-	-
Gunny bags/pack	34.38(14.13)	-	-	-
Loss during marketing	33.96(13.96)	-	-	-
Sorting and Grading	46.86(19.26)	-	-	-
Washing & Cleaning	34.38(14.13)	-	-	-
Total (i to vi)	243.34(100.0)	-	-	-
Selling price of Village Merchant	3308.33	-	-	-
Village Merchant's margin	348.32	-	-	-
Cost incurred by wholesaler	-	-	-	-
Weighing	-	1.17(0.46)	-	-
Gunny bags/pack	30.83(16.50	36.90(14.42)	-	-
Deduction/ Loss	-	97.13(37.96)	-	-
Loss during storage	68.91(36.88)	40.53(19.13)	-	-
Sorting and Grading	41.67(23.30)	33.73(13.18)	-	-
Washing & Cleaning	29.17(15.61)	20.84(8.15)	-	-
Stitching	7.50(4.01)	16.64(6.50)	-	-
Storage	8.75(4.68)	5.78(2.26)	-	-
Marketing Charges	-	3.13(1.22)	—	-
Total (i to ix)	186.83(100.0)	255.85(100.0)	-	—
Cost Incurred by Retailer				-
Transportation	-	-	68.75(24.95	-
Loading & unloading	-	-	28.12(10.20)	-
Gunny bags/pack	-	-	34.38(34.38)	-
Loss during storage	-	-	56.81(20.62)	-
Sorting and Grading	-	-	43.75(15.88)	-
Washing & Cleaning	-	-	31.25(11.34)	-
Storage	-	-	12.50(4.54)	-
Total (i to vii)	-	-	275.56(100.0)	-
Selling price of Retailer	-	-	3816.67	-
Retailer's margin	-	-	511.11	-
Price paid by the consumer	-	-	3816.67	3340.0
Price Spread	341.66	475.89	786.67	193.75

Note: Figures in the parenthesis are percentage to the total cost of respective actors along the chains

cost incurred by producers was worked out to be of Rs. 400.23 per quintal of which highest cost (55.49%) was incurred on deduction by the wholesalers followed by that of transportation (12.77%). The net price received by producers has been observed to be of Rs. 2582.44. The marketing cost incurred by wholesalers was estimated to be of Rs. 255.85 per quintal of which 37.96 per cent cost was due to deduction by traders. Selling price of wholesalers was Rs 3887.98 per quintal of and the margin earned by wholesalers was realized in a tune of Rs. 649.46 per quintal. Then the products are transported by the traders outside the state to Kolkata.

In Channel-III, the marketing cost incurred by retailer was accounted to be of Rs. 275.56 per quintal of which major cost was on transportation (24.95%) followed by cost assessed as a loss (20.62%) in weight during marketing or storage of ginger. The selling price of retailer was reported as Rs. 3816.67 per quintal and the margin earned by him was observed to be of Rs. 511.11/qtl.

In Channel-IV, per quintal marketing cost incurred by the producers was estimated to be of Rs. 193.75. The selling price of producer was observed to be of Rs. 3340 per quintal and net price received was estimated to be of Rs. 3146.25 per quintal.

Price spread of ginger marketing in Meghalaya: The price spread was the highest in Channel-I (Rs. 1427.77/qtl) and the lowest in Channel-IV (Rs. 193.75/ qtl). But, the marketing of ginger through channel-II was the most preferred by the ginger growers. Hence, the channel-II must be equipped more for better marketing of ginger in the state. The increase in price spread in Channel-I was mainly due to increase in marketing cost and marketing margin earned by different actors along the value chains (Table 5).

CONCLUSION

Among the initial cost of cultivation the cost on planting material (rhizome) accounted for a major share with Rs 26670.09/ ha (59.95%) which is followed by land preparation (20.23%), sowing (13.68%) and manure (6.14%). Among the maintenance cost of cultivation, the cost on weeding accounted for a major share with

Rs12766/ ha (55.75%) which is followed by harvesting with Rs 10132.40/ ha (20.23%). The yield of ginger was found to be 3.80 MT/ha. Value chain actors identified in the study area were Input Supply- Farmers (Producers)—Intermediaries (Village Merchant/ wholesalers/Aggregators/Retailers) —Traders (From other state of India)—Consumers. Though the scope of value added through processing increased price and generates local employment, this is not practiced by farmers as it is capital and labour intensive. Channel-II (*Producer-Wholesaler-Trader*) as most popular among the ginger growers in Meghalaya. The price received by farmers in channel-I was found to be less than other channels. Price spread or value addition of ginger in Channel-I and Channel-II was found to be highest as more number of actors involved in the chain. This leads to high marketing cost incurred and more marketing margins earned by different actors in value chain. The price received by the ginger grower was found to be highest in case when farmers sell the produce directly to the consumer but in reality cannot be practice so as the crop is perishable in nature. So the farmers sold bulk quantity of the produce either to Village Merchant or Wholesalers.

Policy Implication : From the study following policy implication were emerged:

• Regulation on marketing costs and margin of actors in the chain is needed.

• The perishable product and bulky in nature requires warehouse facility for proper storage such as cold storage facilities as well as mode of transportation from farmers' farm.

• Research and development in relation to post harvest of ginger need to initiate in all the state including establishment of processing units for the management of surplus ginger to enhance the due share of ginger grower in consumers' price.

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