



Value Chain Analysis of Large Cardamom in Taplejung District of Nepal

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Abstract

This study assessed the value chain analysis of large cardamom (*Amomum subulatum* Roxb) in Taplejung district, Nepal and explored the functional linkage and upgrading strategies among the key value chain actors. One hundred and sixty farmers were surveyed purposely along with 5 local and district level traders, 5 regional level traders and exporters and 5 enablers who were sampled using rapid market appraisal in March 2018. The study presents a comparative analysis among large holders (n=72) and smallholders (n=88) large cardamom farmers using SPSS and MS-Excel. The majority of farmers used suckers as propagating materials which was a major source of disease conduction. 62.5% of farmers adopted traditional dryers for curing, which reduced the quality of large cardamom whereas about 30% of them used improved dryers for curing that enhanced quality. The majority of farmers had not adopted value addition practices like tail cutting, grading and packaging which were carried out at trader level. Large cardamom prices were normally determined by the export market of India. The average land area of large cardamom per household was 21.56 ropani with 36.74 ropani for the large landholder farmers and 9.14 ropani for the smallholders. The key problems faced by farmers and traders were high price swing, lack of disease-free propagating materials, reliance on the Indian market, aged orchards, shrinking productivity, and minimal collaboration among the chain actors. Therefore, adoption of Good Management Practices (GMPs)- upgraded bhattis, transfer of tail cutting technology and storage management, along with value addition activities like grading (color and size), tail cutting and packaging need to be adopted with strong adherence to export quality. This study revealed that necessary action needs to be taken to maintain a high level of collaboration among the value chain actors thereby increasing the value chain efficiency of Nepalese large cardamom.

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Keywords

Functional linkage; Large Cardamom; Marketing Price; Problems; SWOT; Upgrading strategies; Value chain

1. Introduction

Large Cardamom (*Amomum subulatum*, Roxb.) is an evergreen, perennial and herbaceous spice crop of Zingiberaceae family, which is known as *Alaichi* in Nepali and renowned as Queen of Spices and Black Gold (Shrestha, 2018). According to Timsina *et al.* (2012), the record of large cardamom in Nepal goes back to 1865 in Ilam, nevertheless commercialized cultivation commenced in Ilam in around 1953. Its cultivation is gradually spreading and reached 51 districts in 2017 (MoALMC, 2017).

Nepal is the largest producer and exporter of large cardamom with 55 % of the average annual world production, followed by India and Bhutan (GON & ITC, 2017). Since 1993 both the production and land area of large cardamom have increased with a Compound Annual Growth Rate (CAGR) of 0.530 % and 0.490 % respectively (Shrestha, 2018). The main districts in the cultivation and marketing of large cardamom in Nepal are Ilam, Panchthar and Taplejung where Taplejung alone covered 33 % of productive area and 38 % of the overall production of large cardamom in the country (MoALMC, 2017). Among all, Taplejung is identified as the lead district in terms of land area and production occupying 23.33 % of the total area with 45 % of the national production. The productivity of cardamom was also highest in Taplejung with 0.7 MT ha⁻¹ in comparison to the national productivity of 0.36 MT ha⁻¹ (DADO, 2017).

Price variability has been a conscious problem of the large cardamom industry in Nepal (Poudel and Chen, 2012). International market trends show that the demand of large cardamom is at the rate over 15% annually and Nepal stands a good chance to become the leading exporter to the world market (FLCEN, 2016). “Despite the significant contribution in rural and national economy, cardamom has failed to attract support in dealing with different problems such as pests and diseases problems, low quality cardamom, highly fluctuating market, narrow market base and lack of support services.” (Chhetri, 2007); Chapagain *et al.* (2014), illustrated that, “the heavy plantation of large cardamom within the community forest or any other National forests resulted in degradation of the natural forest, such as the *Alnus nepalensis* (Uttis). Analyzing the situation, the DFO started interfering with large cardamom cultivation in any type of national forests. The market actors whose livelihoods are directly associated with large cardamom cultivation are fretful due to contemporary disease like Chirkey and Furkey, and concerned organizations are seen baffled to address the problem” (Rai and Chapagain, 2014). Even though the marketing channel, being strong and district traders, are steadily involved, the weak coordination among the chain actors is hampering the production and marketing of the cardamom sub-sector.

The value chain study of the large cardamom provides in-depth understanding of key agriculture stakeholders such as producers/farmers, traders, processors and exporters to work together to increase commercialization in large cardamom. Various cross cutting issues related to production and marketing throughout the value chain, price at each stages of value chain, how the actors of value chains are linked, addressing the problems in the chain and recommending the appropriate upgrading strategies and methods of strengthening the market linkages with the major objectives to analyze the value chain function, enabling environment, market chain and inputs/service and to investigate the value chain upgrading and governance structure of large cardamom has been the major concern of the study.

2. Materials And Methods

The site selected for the study was Phungling Municipality of Taplejung District, Province 1, Nepal. According to the 2011 general census, the district has a population of 127461 inhabitants living in 26509 households and covering an area of 3646 km² (1408 sq. mi). The district is the leader in terms of land area, production and productivity which justifies its choice as the case study for this research.

A sample of 160 farmers was used and the sample size was determined with the help of a database management system, Raosoft Inc. with 95 % confidence level, 7.7 % margin of error and 50 % response distribution. Five local level and district level traders were selected to determine market channel and value chain using snowball technique. Five enablers were selected purposely at various levels and stages from local to national level.

A semi-structured questionnaire was used to collect the data required to carry out the research. The questionnaire was designed using KOBO Toolbox (<https://kf.kobotoolbox.org/#/forms/axSXt7qMgrTb8Att3 Y9q7x>) that dealt with issues specific to production and marketing of large cardamom. An effort was made to incorporate questions into the questionnaires, pertaining to key issues identified in addition to different checklists developed and used to collect information from the producers, local and district level collectors, wholesalers, exporters and enablers.

The primary data were collected by household survey through pre-tested interview schedule, focus group discussion, key participant interview and direct observation while the secondary data were gathered from district profile, Village Development Committee/s/Rural Municipality/s (VDCs/RMs) Profile, published reports of Ministry of Agriculture and Livestock Development (MoALD), Food and Agriculture Organization (FAO), Agribusiness Promotion and Marketing Development Directorate and Central Bureau of Statistics (CBS), and supporting organizations publications like the Federation of Large Cardamom Entrepreneur Associations of Nepal (FLCEAN), the International Centre for Integrated Mountain Development (ICIMOD), the International Trade Center (ITC) and the Trade Export and Promotion Center (TEPC).

The data were coded, tabulated and analyzed using Statistical Package for Social Science (SPSS) and Microsoft Excel. To compare the different chains, the recorded data was analyzed descriptively, using weighted and non-weighted averages, percentage shares as well as standard deviations. In depth discussion with key actors of value chain was made on SWOT analysis.

In order to understand the traits of the value chain players and the interrelationships among them a value chain map of large cardamom sub-sector was prepared with all attempts to make the maps easily comprehensible. The enabling environment providers and institutions which govern the large cardamom value chain of Nepal were identified and their functional relationship was analyzed.

A number of variables like population distribution, family size, size of the land holding, household income, category of land, etc. were analyzed by using simple descriptive statistics such as percentage, frequencies, standard deviation and mean.

According to the Agriculture Development Strategy (2015-2035) (ADS, 2014) “the rural population is classified into three groups; commercial farmers (with 1 to 5 ha of land), subsistence farmers (with 0.5 to 1 ha of land) and landless and near landless (less than 0.25 ha)”. This knowledge was referenced in the study to categorize the respondents as large land holders (farmers cultivating plots larger than 1 hectare) and small land holders (farmers cultivating plots less than 1 hectare)

A five-point scaling technique was used to analyze the farmers’ perception on the importance given to the different production and marketing constraints. The direction and severity of thoughts of the respondents towards any proposition is obtained by a scaling technique. The index of importance of different production and marketing constraints was calculated using the following formula (equation 1).

$$I = \sum S_i f_i / N \quad (1)$$

Where,

I = Importance/ severity index

\sum = Summation

S_i = Scale value at i^{th} importance/severity

f_i = Frequency of importance/severity given by the respondents

N = Total number of respondents ($\sum f_i$)

Subedi et al. (2019a) adopted this scaling technique to explore the problems associated with potato production in Terai region of Nepal. They also used this technique (Subedi et al., 2019b) to find the production problems associated

with wheat. This above formula was also applied by Shrestha and Shrestha (2017) to “rank the problems with maize seed production”.

The strength, weakness, opportunities and threats (SWOT) related to cardamom value chain were analyzed from the group discussion, interview and key participants. The analysis was carried out at each functional level of value chain i.e., input supply, production, collecting/trading, wholesaling and retailing. Information thus obtained from different actors in the value chain was used in SWOT analysis.

3. Results

3.1. Socio-Economic Characteristics

Out of the total sample of 160 farmers, 45 % were large landholders (72) and 55 % smallholder farmers (88). The overall average age was 50.93 years (Table 1). The overall average period of schooling was 6.14 years. The overall average family size was 5.81. The economically active household members were 4.04. The dependency ratio¹ was 59.89 % with greater dependency among the smallholders 63.02 % followed by 56.11 % among the large land holders (Table 1). The average number of people involved in the cardamom production were 2.49 per grower, with 2.69 members actively involved among large landholders and 2.33 among smallholders (Table 1). The total land holding was 27.32 ropani² where large landholders possessed 42.12 ropani and smallholder’s owned 15.10 ropani. The total irrigated land was 20.68 ropani with 32.03 ropani of irrigated land owned by large landholders and 11.39 % by the smallholders. The average cardamom cultivation area was 21.56 ropani with the cardamom cultivation area of 36.74 ropani for the large land holder farmers and 9.14 ropani for the smallholders. The overall experience of cardamom farming was 18.36 years.

Table 1. Socio-demographic characteristics (continuous variables)

Variables	Overall (n=160)	Large landholders (n=72)	Small holders (n=88)	Mean difference	T-value
Age of HHH	50.93	51.96	50.09	1.87	-0.931
Year of schooling	6.14	8.06	4.58	3.476	6.013***
Total family size	5.81	5.99	5.66	0.33	0.911
Economic active HH members	4.04	4.20	3.90	0.29	0.961
Dependency ratio (%)	59.89	56.11	63.02	-6.91	-0.659
Members involved in cardamom production	2.49	2.69	2.33	0.36	2.564
Total Land Holding (ropani)	27.32	42.12	15.10	27.14	5.89***
Irrigated Land (ropani)	20.68	32.03	11.39	20.63	6.03**
Cardamom cultivation (ropani)	21.56	36.74	9.14	27.60	9.196***
Experience of cardamom farming in years	18.36	21.06	16.16	4.89	2.582**

Note: *** and ** indicate significant differences at 1 and 5 % levels respectively.

¹ Dependency ratio is the percentage of ratio of dependent population (children aged under 15 and older population above 65 years) to economically active population (aged 15-64 years)

²20 Ropani= 1 Hectare

Table 2 depicts the majority of male headed HH in the study area. The majority of the households, 56.2 % were literate. In terms of ethnicity, the sample comprised 55 % *adivasi/janjati* followed by 41.9 % of *brahmin/chhetri* and 2.3 % Dalits (Table 2). Remittance was the major source contributing to the gross domestic product in the country. Decisions regarding the cardamom cultivation and selling were mutually done. The majority of the farmers i.e. 97.5 % had access to loans. The majority of the farmers (96%) were associated in some sort of farmers group which indicates that the farmers were well aware about the benefits and opportunities of being together within the groups. Overall, 36.2 % received training related to cardamom farming, of which 40 % were large landholders and 34 % of the smallholder farmers. The major source of training was I/NGOs (78%) followed by governmental organizations (35.5%). The majority of the farmers (60.6%) received technical assistance regarding cardamom cultivation.

Table 2. Socio-demographic characteristics (categorical variables) by land category

Variables	Large landholders	Small holders	Overall	Chi-square value
Gender of HHH				
Male	61(84.7)	82(93.2)	143(89.4)	2.98*
Female	11(15.3)	6(6.8)	17(10.6)	
Education				
Illiterate	12(16.7)	58(65.9)	70(43.8)	39.10***
Literate	60(83.3)	30(34.1)	90(56.2)	
Ethnicity				
<i>Brahmin/chhetri</i>	25(34.7)	42(47.7)	67(41.9)	2.94
<i>Aadibasi/Janjati</i>	44(61.1)	44(50.0)	88(55)	
<i>Dalit</i>	3(4.2)	2(2.3)	5(3.1)	
Decision about cardamom cultivation and selling				
Male	26(36.1)	43(48.9)	69(43.1)	3.13
Female	5(6.9)	3(3.4)	8(5.0)	
Both	41(56.9)	42(47.7)	83(51.9)	
Access to loan				
Yes	71(98.6)	85(96.6)	156(97.5)	0.663
No	1(1.4)	3(3.4)	4(2.5)	
Membership in social group				
Yes	69(95.8)	85(96.6)	154(96.2)	0.063
No	3(4.2)	3(3.4)	6(3.8)	

Table 2 Continued

Training				
Yes	28(38.9)	30(34.1)	58(36.2)	0.394
No	44(61.1)	58(75.9)	122(63.8)	
Technical Assistance				
Yes	43(59.7)	54(61.4)	97(60.6)	0.045
No	29 (40.3)	34 (38.6)	83 (39.4)	

Notes: Figures in parentheses indicate %. ***and * indicate significant difference at 1 and 10 % levels, respectively

3.2. Status, Value Addition Activities and Marketing of Large Cardamom

Area and production of LC was figured to be in increasing trend in the study district. The area under LC plantation has increased from 2,925 ha in 2011/12 to 4,200 in 2017/18. Similarly, the overall production has also increased from 1,410 in 2014/15 to 2,940 mt in 2017/18. However, productivity seems to be fluctuating in the given period. The productivity was lowest i.e.360 kg/ha in 2014/15 and greater productivity in before and after consecutive years. The highest area, production and productivity till date, 4,200 ha, 2,940 mt and 700 kg/ha was recorded in 2017/18 respectively (Figure 1).

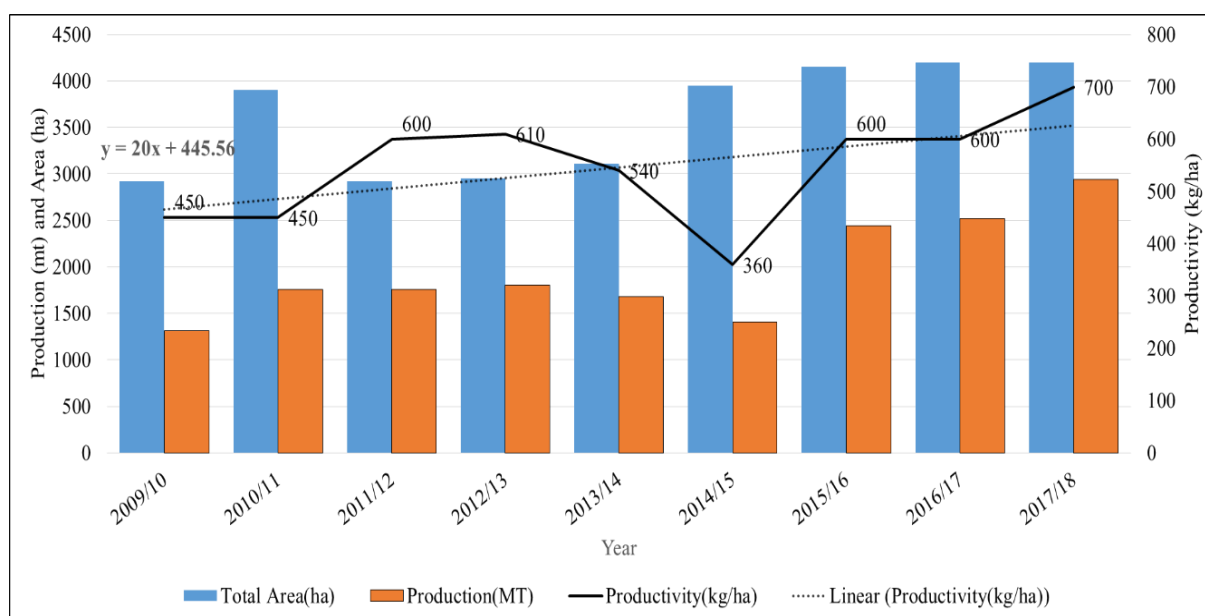


Figure 1 Area, production and productivity of large cardamom in Taplejung District

(Source: DADO Taplejung (F.Y. 2009/10-2017/18)

The overall production trend of LC as shown in Table 3. depicts that the total production of the large cardamom seemed to remain relatively stagnant over the last five years with an average production of about 200 kg. Among the large land holder farmers, the production trend seemed to be gradually increasing from 236.32 kg in 2013 to 307.34 kg in 2017 while the trend seemed to decrease in case of smallholders from 171.64 kg in 2013 to 113.71 kg in the year 2017.

Table 3. Production trend of large cardamom in the study area

Year	Overall	Large landholders	Small holders	Mean difference	T-value
2017	202.88	307.34	113.71	193.63	6.30***
2016	191.60	285.17	111.89	173.28	4.83***
2015	202.74	280.00	130.85	149.15	3.37***
2014	206.11	259.34	152.07	107.27	1.82*
2013	204.99	236.32	171.64	64.67	0.79

Notes: Figures in parentheses indicate %. ***and * indicate significant difference at 1 and 10 % levels, respectively

Mostly, the inputs for the production of LC were obtainable locally. The major inputs required were land and labor, seedlings, irrigation, fuel, machinery-tools and jute bags supply inputs. The farmers get the required inputs from regional and district level input traders through their district or local level distributors, agents, retailers or agro-vet supplier shops. Ramshahi (73 %) followed by Golshahi (16 %) and Ramla (2 %) are some of the mostly grown varieties in the district. The majority of the farmers (80%) used the old stocks from their own farm or nursery while 99 % farmers used either old stocks, suckers or seedlings from others' farm or nursery. Agriculture Development Section and Cardamom Development Center (CDC) provides 5 % of total share of seedlings and seeds. The farmers do not practice chemical fertilizers during the production which is considered an organic LC production in the districts.

Table 4. Input requirements and suppliers' network

Inputs required	Suppliers	Share (%)	Source or origin
Land and labor	Locally available	100 % locally	Nepal
Seedlings or seeds	Locally available (own farm/other farms and private nursery)	95 %	Nepal and India (Sikkim)
	DADO, CDC	5 %	
Water and electricity	Drinking Water Corporation, free running water and Nepal Electricity Authority	100 % Domestic	Nepal
Fuel	Nepal Oil Corporation	100 % Imported	India
Machinery and tools	Regional or district distributors	Regional-40% District-60 %	India or Nepal
Fertilizer and pesticides	Agriculture Inputs Co. or district distributors	100 % Imported	India
Jute bags	Jute products manufacturing companies in Biratnagar	100 % Domestic	Nepal
Jute bags, plastic-coated	Plastic and plastic bag manufacturing companies	Domestic-40 % Imported-60 %	India and Nepal

Source: ITC, 2019 and Field Survey, 2019

The major processing activities in large cardamom include curing followed by cleaning, grading, grinding and tail cutting. A majority of the households (88%) cured the product. Tail cutting, grading and grinding is carried out mostly after cleaning and curing the product at local and regional levels. Recently, around 1 % farmers were found to practice

tail cutting. The majority of the post- harvest activities, including grading and tail cutting, was carried out at the regional level.

Table 5. Post-harvest management of the large cardamom

Processing of large cardamom (1=Yes)	Large landholders	Small holders	Overall	Chi square value
Cleaning	57(79.2)	66(75.0)	123(76.9)	0.387
Curing	62(86.1)	79(89.8)	141(88.1)	0.507
Tail Cutting	1(1.4)	1(1.1)	2(1.2)	0.020
Grading	2(2.8)	3(3.4)	5(3.1)	0.052
Grinding	2(2.8)	1(1.1)	3(1.9)	0.580

Note: Figures in parentheses indicate %

There were two types of *bhatties*³ for curing the cardamom. The majority of the households (62.5%) were still using traditional *bhatties* while 30.6 % were using improved smokeless *bhatties* (Table 6). This study found out that a higher proportion of farmers in both categories were adopting traditional methods. Curing technique was found to be statistically significant among the categorized farmers at 5 % level of significance. Also a very few (about 7%) of the households cured their product directly in sun which can be attributed to the coinciding of harvesting season with rainy season followed by winter in the high hill regions.

Table 6. Method of curing

Curing of cardamom (I=Yes)	Large landholders (n=72)	Small holders (n=88)	Overall (n=160)	Chi square value
Traditional <i>Bhatties</i>	39(54.2)	61(69.3)	100(62.5)	3.88**
Improved <i>Bhatties</i>	28(38.9)	21(23.9)	49(30.6)	4.2**
Sun Drying	5(6.9)	6(6.8)	11(6.9)	0.057

Notes: Figures in parentheses indicate %. *** and ** indicate statistical significance at 1 and 5 % levels respectively.

The major basis of grading among the few households (i.e. 3% of total) was based on size of the product followed by color and boldness of the product. Among the categories, large land holder farmers were found to grade the product only on the basis of size while the smallholders were found to be grading by size, color and boldness in equal proportions. The grading's tedious nature and the lack of standard grading criteria by vendors in addition to shortages of tools and techniques among the producers result in minimum grading percentages at farmer's level.

Table 7. Basis of grading of large cardamom

Basis of grading (1=Yes)	Large landholders	Small holders	Overall	Chi square value
Size	3(4.2)	2(2.3)	5(3.1)	0.469
Color	0(0.0)	2(2.3)	2(1.2)	1.657
Boldness	0(0.0)	2(2.3)	2(1.2)	1.657

Note: Figures in parentheses indicate %

³ Large cardamom capsules curing structure

The large cardamom is stored in air tight sacks by 58.1 % of the total sampled households followed by 10 % in wooden platforms and spread in naked floor by 5.6 %. Storage of cardamom in wooden platforms was found to be significant statistically at 5 % level of significance as per observed p-value.

Table 8. Storage practice of the large cardamom by the farmers

Storage of large cardamom (I=Yes)	Large landholders	Small holders	Overall	Chi square value
Air tight sacks	43(59.7)	50(56.8)	93(58.1)	0.137
Wooden platform	12(16.7)	4(4.5)	16(10.0)	6.465**
Spread in naked floor	6(8.3)	3(3.4)	9(5.6)	1.809

Notes: Figures in parentheses indicate %. ** indicates statistical significance at 5 % level.

It was found that 95.6 % of the producers were selling their cardamom to district headquarter-Phungling while 4.4 % of the producers sold theirs directly outside the district (neighboring districts). The similar result was found among the farmers' categories regarding districts where to sell. Farmers were commonly using two points of sale i.e. from home (95%) and from village market (93%) and some farmers adopting both points of sale. Majority of the households (95%) sold their product via district level collectors followed by 36 % of the producers selling through village level collectors. Majority of the large landholders and smallholders were selling their product to the district level collectors.

Also, 76 % of the total producers were found to have an oral agreement with the traders while no any sort of written agreement was found among the producers and traders. The major payment mechanism among the producers and the traders was down payment followed by the advance mode of payment. About 95 % of the producers receive hand cash at the time of trading while 74 % of the farmers received advance payment. Similar results for payment mechanisms were obtained among the farmer's categories. The farmers stored their product at the traders store without any charge. The farmers benefit themselves by acquiring the necessary logistics for running their livelihoods and basic cardamom orchard management from the traders. The producers cut the price of the product in consultation with the traders when they fetch the appropriate price or when they are in need of the money.

Table 9. Marketing of large cardamom in the study site

Parameters (I=Yes)	Category	Large landholders (n=72)	Smallholders (n=88)	Overall (n=160)	T/Chi square value
District to sell	Taplejung	70(97.2)	83(94.3)	153(95.6)	0.798
Place to sell	From home	68(94.4)	81(92.0)	149(93.1)	0.356
	From village level market	70(97.2)	82(93.2)	152(95)	1.361
Collectors Involved	Village level collectors	26(36.1)	32(36.4)	58(36.2)	0.001
	District level collectors	70(97.2)	82(93.2)	152(95.0)	0.243
Agreement	Oral Agreement	57(79.2)	65(73.9)	122(76.2)	0.615
Payment mechanism	Advance payment	55(76.4)	64(72.7)	119(74.4)	0.279
	Down payment	70(97.2)	83(94.3)	153(95.6)	0.798

Note: Figures in parentheses indicate %. *** indicates statistical significance at 1 % level.

The leading actors in the value chain of LC were found to be farmers, local level collectors, district level collectors, regional level collectors and exporters. Both categories of farmers, large land holder and smallholder farmers, solely depend on village level collector and district level traders for the distribution of the marketing of the cardamom. Thus,

the regional level traders are the major stock center and a chain to the international markets. The regional level traders upgrade the value of large cardamom through various post harvesting techniques including cleaning, sorting, curing, tail cutting, grading and packing of the bulk mass of cardamom. The majority of the regional traders are also acting as exporters.

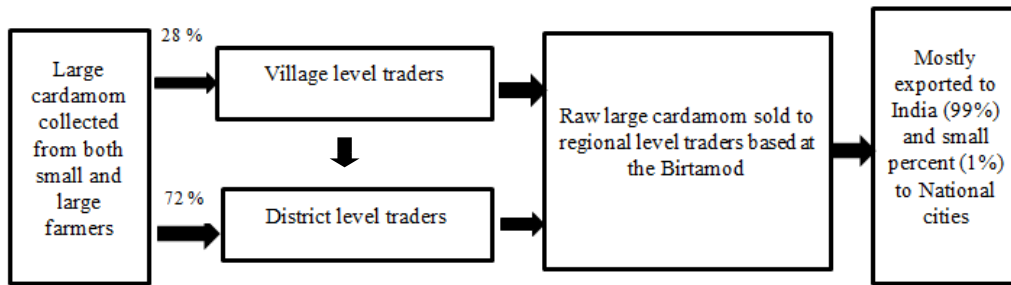


Figure 2 Product flow of large cardamom

Various channels of marketing were identified in the study area. The service provided by the traders such as credit facility and input supplies followed by the farmer’s capacity to stock the product has been a major concern in determining the market channel. Similar market channels in Bhojpur district were reported (Kalauni & Joshi, 2019). Mostly, farmers were selling their product to the village or local traders/agents. The Marketing channels identified are presented diagrammatically in the figure 3 below:

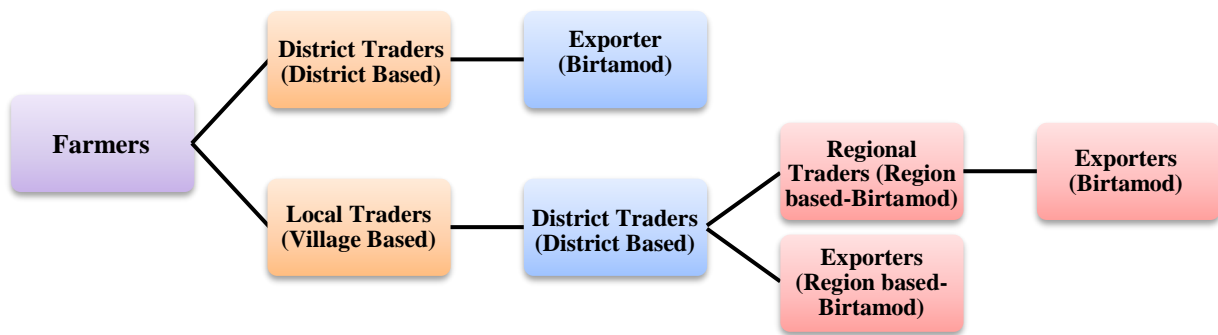


Figure 3 Marketing Channels of large cardamom in the study area

(Source: Self Illustration, 2018)

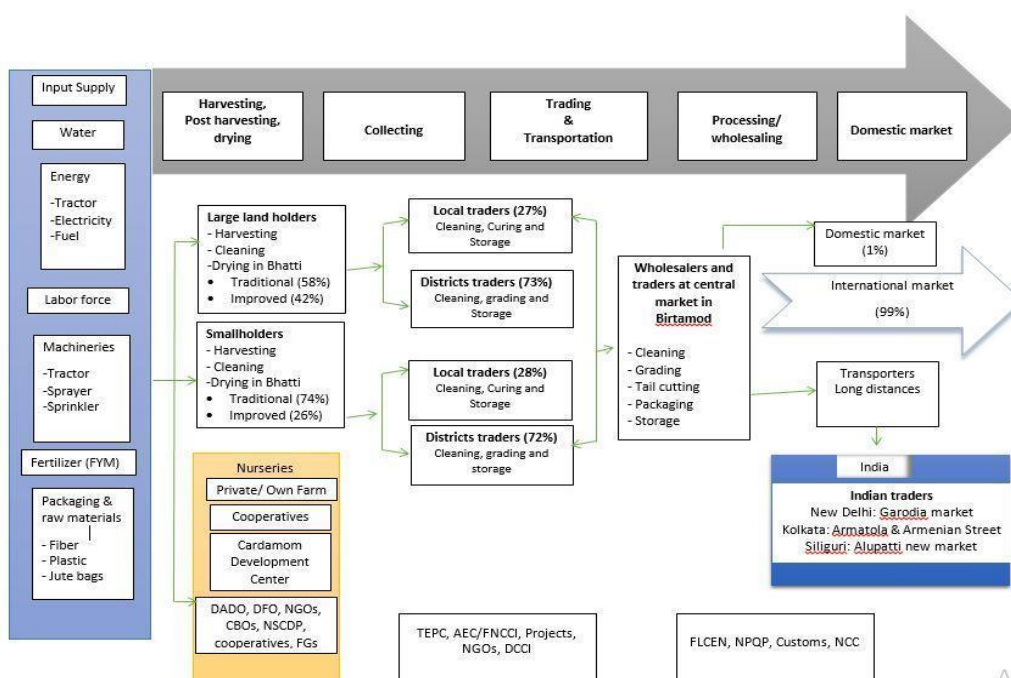


Figure 4 Value chain map of large cardamom in the study area

(Source: Author, 2018)

3.3. Major Value Chain Actors

Farmers: Individual farmers, representing almost 97 % of total production, were the main actors engaged in production of large cardamom. Similarly, UNNATI (2016), estimated that more than 67,000 farmers are involved in LC farming all over Nepal, which considers 25,000 HH from Illam, Panchthar and Taplejung districts. The average cardamom cultivation area of farmers in the study area was 21.56 ropani with 36.74 for the large landholders and 9.14 for the smallholders. The average amount of the cardamom sold by individual farmers annually amounts to 153.2 kg with the large landholders selling the average amount of 236 kg and 85.2 kg sold by smallholders. The key functions these farmers mainly carry out include land preparation, inputs management, post-harvest practices like cleaning, tail cutting, drying, grading, bulk packing, storing and transportation to village collection centers or to the local level collectors. The washed and cleaned harvested products were taken to the dryer within a week.

Local collectors/traders: Local collectors were found to be the agents of traders in district market centers, who work themselves for district traders (Phungling) or wholesalers (Birtamod). There were 65 local level collectors in the Phungling municipality which is also the major market hub within the district. They were individually responsible to their district trader. The cardamom produced is packed in a jute sack as well as plastic inside a jute sack bag provided by the Agriculture Development Section. Local collectors have a crucial role of managing and transporting the products from village centers to district traders.

District collectors/traders: In the district there were 2 to 5 market centers with 25 traders engaged in LC trading. The product from village collection centers was transported to and collected at district market centers. The district level traders do not practise any sort of processing. The traders receive clean and cured cardamom. The traders only store the cardamom till they fetch the reasonable price from the regional target, Birtamod. The transport cost for trading to Birtamod is carried by the district traders themselves. Cardamom trading occurs throughout the year but the traders mainly start receiving the cardamom from the month of Bhadra-Ashoj while the remaining peak trades in the month of Mangsir (75 % of the produced cardamom) and declining forth forward. The major functions of district traders include making provision for advance payments to farmers, arrange post-harvest management (such as cleaning, grading, repackaging and storage) until wholesalers in Birtamod keeps the order, determine the final price as per regional price and finally arrange transportation of product up to wholesalers. They are affiliated to the cardamom traders' association and follow the traders' standards and product quality accordingly.

Most of the places in Phungling municipality had road access and therefore a tractor was hired for collective transportation of the product either to the village collector or directly to the district traders or farmers carrying the load to the nearby collector depending on the quantity of product. A bulk of large cardamom at the districts were transported to the wholesalers at Birtamod via tractor, truck or pickup. The cost of the transportation was covered by the selling parties.

Regional collectors/ traders/ Wholesalers/ Exporters: According to Nepal National Sector Export Strategy of Large Cardamom, 2017-2021, the number of wholesalers in Birtamod were 30, of which the exporters of LC count were 4 of LC (GON & ITC, 2017). The regional level traders rely on their work experience for trading the cardamom at an international level. They receive the major portion of the product in Mangsir starting from Bhadra-Ashoj. The major cost for running the business was accounted for by storage, transport and processing. They were responsible for the transportation fair and custom tariffs for transporting the product. The wholesalers/exporters conduct purchasing LC from district traders and some large local level collectors and manage transport (up to Birtamod) along with payments to district traders. Grading, packaging, storage and transportation either from Birtamod or Biratnagar /Jogbani border crossing point, preparation of export consignments and documentation for clearance at Customs point is organized by wholesalers. The traders mainly called the government to establish and promote the brand "Everest Big Cardamom" that might help in recognizing the domestic product in the international market and keep the importers secured about the quality standards and volume of the product. The traders had been appealing to the government for creating the congenial environment of trading directly to Bangladesh by declining or supporting the duty free trading which may help to break down the monopoly of the Indian market. Approximately 98 % of the tail cutting is done at the regional level whereas only about 2 % is done among the farmers. Tail cutting, usually done using simple scissors,

is a tiresome process and is usually carried out by females, charging per the volume/weight that they process. Both males and females are involved in cleaning.

Regional Traders grade the LC in three groups – Jumbo Jet (JJ), Standard / Super Delux (SD) and usual types known as Chalanchalti or Ilami for quality selling as well as making price variation to the producers.

Table 10. Grade and specification of the large cardamom in Nepal

Grade and specification	Jumbo-jet (JJ)	Standard(Super) Delux (SD)	Chalanchalti/Ilami (CC)
Hygiene	Dust free, smoke less and fungus free		
Size	Larger	Larger	Smaller
Tail cutting	Yes	Yes	Less than 15% tail
Color	Natural	Natural	Natural
Moisture Percent	Less than 12%	Less than 12%	Less than 12%
Medium sized	Less than 5%	Less than 10%	

Source: FLCEN (2016)

Nepali collectors and exporters sell whole pods in superior jute handy bags, branded labeled bags are highly preferred. Indian trucks enter Nepal through Birtamod and the consignments are loaded directly in the truck from the warehouse of the wholesaler and then transported to India through the Biratnagar / Joghani customs point. Only two Indian transport companies had monopolized the transportation of LC from Nepal to India. The average truckload of LC was about 10 tons (GON, 2017).

The price information or the price is normally determined by the buyers in Delhi, Siliguri or Kolkata market and subsequently respective prices by other traders in the central, wholesale, district and village market centers were determined. Pricing for farmers and traders mainly relied on the grading of products within the country. LC is normally graded into three groups; JJ, SD and CC, which determines the price range. Size of capsules (the larger size fetches more price), tail cutting (fetches more price), moisture content below 12 % is considered ideal and color and appearance (light brown fetches more price) are the major factors determining the grade of LC. The price information collected from FLCEN revealed high price fluctuation of LC in subsequent years. In contrast, there was high fluctuation within month and day as per the farmers and traders involved.

Siliguri in India is the central market for LC but during the past decade the market hub shifted to Delhi and Kolkata. Around 50% of Nepali LC is marketed to outside nations (especially to Pakistan) from Delhi and Kolkata along Amritsar and Mumbai. Payment is cost and freight (CFR)–Delhi

Table 11. Major market centers for LC

India	Pakistan	Bhutan	Nepal
Siliguri: Alupatti New Market	Karachi : Jodia Market	Phuntsholing Auction Market	Fikkal,
New Delhi : Garodia Market	Lahore : Akbari Mandi		Dhankuta
Kolkata : Amartola and Armenian Streets	Rawalpindi : Ganj Mandi		Birtamod

Source: FLCEN (2016)

The major organization, enablers and facilitators involved in the large cardamom sector with their roles are briefly tabulated in table 12 below.

Table 12. Organizations, Enablers and Facilitators

Institutions	Roles
Organization/Sector Associations	
Federation of Large Cardamom Entrepreneurs of Nepal (FLCEN)	Birtamod wholesalers are organized under one umbrella, FLCEN, which assists only the trade making policy sector linked with government agencies. Traders' rights, facilities are reflected with the government through the institutions.
Policy Support	
Cardamom Development Centre, Fikkal (CDC)	With the purpose of cardamom research and development, this institution has been working especially for seedling production and training the cardamom farmers and cardamom related activities. This is only one Government farm, which is producing and distributing quality cardamom seeds and saplings in the country.
National Spice Crops Development Programme (NSCDP)	NSCDP, a national level institution, mainly focuses on cardamom policy development, implementation and assisting financial issues. Technology transfer among LC growing districts and farmers, policy, implementing constraints, subsidies including national coordination is also governed by the NSCDP.
Agriculture Development Offices	Its role and responsibilities in particular cardamom development includes cardamom area expansion, startup of cardamom nursery, training farmers, dissemination of seed and seedlings and cardamom plantation management along with coordinating district level DCCI, FLCEN and traders while formulating district level policy and plan including processing/ drying facilities establishment.
Trade service network	
Trade and Export Promotion Centre (TEPC)	TEPC maintains cardamom export import data from export import point. Presently, the export brand logo as "EVEREST BIG CARDAMOM" has been finalized by the TEPC and FLCEN in order to facilitate trade of cardamom in addition to launching the processing /dryer construction especially in new areas of cardamom growth.
Federation of Nepalese Chamber of Commerce and Industries/ Agro Enterprise Centre (FNCCI/AEC)	Agro Enterprise Centre, a private sector under the FNCCI, gathers market rates of LC from various markets and updates it to centers providing market information. Additionally, AEC recommends for improvement of LC industries with GoN and advocates export promotion programs.
International Trade Center (ITC)	ITC assisted Nepal in framing a National Sector Export Strategy for LC. This Strategy is a comprehensive five-year roadmap for enhancing productivity and export promotion to achieve greater penetration in existing markets for LC. The Strategy is underpinned by an overall vision of "developing Nepali Black and Pink Everest Cardamom production and quality to increase export revenues and support sustainable economic development".

Table 12 Continued

Research	
Nepal Agricultural Research Council (NARC)	The development objectives of NARC are “to conduct qualitative studies and research, identify constraints and issues, and propose policy and strategic measures for the overall development of agriculture. NARC also coordinates, monitors and assesses agricultural research activities conducted by other government and non-government agencies in Nepal. The Agricultural Research Station in Pakhribas is involved in crop research and training on the agronomic, pre-harvest and postharvest practices of large cardamom. National Commercial Agriculture Research Programme (NCARP) in Pakhribas is also responsible for conducting research on large cardamom varieties and agronomic practices”.

3.4. Production and Marketing Problems in Large Cardamom

Different problems were faced by the farmers during the cardamom cultivation and production. Five points scaling technique (1, 0.8, 0.6, 0.4 and 0.2) was used to detect the relative seriousness of the production problem. The value obtained from the ranking scale revealed that the attack of pest/disease has maximum index value (0.9) and minimum was for the lack of quality rhizome/seedling with the index value of 0.39. Relative seriousness of the problem faced by the farmers followed the sequence of attack of the disease/pest followed by limited irrigation facilities or poor rainfall; limited technological knowledge mainly improved cultivation practices; scientific nursery management and post-harvest handling; limited farm labor and limited quality rhizome/seedlings. The major diseases prevailing were *Chirkey*, *Furkey* and sheath rot.

Table 13. Various production problems of LC farmers in the study area

Problems	Major factor (1) to Minor factor (0.2)					Weight	Index	Rank
	1	0.8	0.6	0.4	0.2			
Attack of pest /disease	82	76	1	0	1	143.6	0.90	I
Irrigation/poor rainfall	77	55	10	9	9	132.4	0.83	II
Limited technological knowledge	1	11	45	87	16	74.8	0.47	III
Limited availability of farm labor	1	11	64	16	68	68.2	0.43	IV
Limited quality rhizome/ seedlings	0	7	41	47	65	62	0.39	V

Various problems were faced by the farmers during the marketing of the cardamom. Five points scaling technique (1, 0.8, 0.6, 0.4 and 0.2) was applied to notice the relative intensity of the marketing problems. The value obtained from the ranking scale depicted that the low seasonal price/price fluctuation had the maximum index value (0.92) and minimum was for the distance to market with the index value of 0.23. Relative intensity of the problems faced during marketing of the cardamom followed the sequence of low seasonal price or price fluctuation; more gap between farm gate and retail price; limited marketing knowledge; poor transportation and distance from market.

Table 14. Various marketing problems of LC farmers in the study area

Factors	Major factor (1) to Minor factor (0.2)					Weight	Index	Rank
	1	0.8	0.6	0.4	0.2			
Low seasonal price /Price fluctuation	104	52	3	1	0	147.8	0.92	I
Higher marketing cost	48	75	34	1	2	129.2	0.81	II
Limited marketing knowledge	6	30	104	15	5	99.4	0.62	III
Poor transportation	3	3	13	126	15	66.6	0.42	IV
Distance to market	0	0	4	18	138	37.2	0.23	V

4. SWOT Analysis

The strength, weakness, opportunity and threats (SWOT) of cardamom was analyzed based on the interaction with the farmers, local traders, member of cooperatives, district level traders, regional level traders, organizations and enablers and facilitators. The production and marketing problems are illustrated in the Table 15.

Table 15. Strength, weakness, opportunities and threats of large cardamom production and marketing

Strength	Weakness
Production	
i. Traditional knowledge on cultivation ii. Long productive period iii. High value crop even with frequent price alteration and is known as black gold iv. Long storage life v. Conducive agro-climatic condition and diversified topography vi. Best suited crop for small and marginalized farmers vii. Marginal investment to garner continuous income viii. Crop insurance (75 % subsidy on premium by government)	i. Ageing of crop and poor management resulting decline in yield ii. Limited technical knowledge resulting poor quality product iii. Weak extension services to transfer technology iv. Limited quality inputs v. Increased infestation of diseases and pests vi. Inadequate research and development facilities vii. No insurance policy adopted by growers viii. Shortage of skilled technical manpower ix. Inconsistent government policies
Marketing	
IX. High value low volume crop X. Long storage life XI. Profit is relatively higher XII. Steady growth in export volume and earnings XIII. Established cash crop, prioritized and valued as top exportable commodity by NTIS/MoCS	x. Non-existence of auction practice xi. Weak bargaining capacity of farmers xii. Lack of market information & poor market access intelligence xiii. Suitable branded logo yet to be finalized as Everest Big Cardamom xiv. Farmers lack their own organized marketing unit xv. Price fixation mechanism is unknown x. Adulteration

Table 15 Continued

Opportunities	Threats
Production	
<ul style="list-style-type: none"> i. Suitable climate and geography possessing comparative advantage ii. High affinity of farmers towards LC production iii. Prioritized crops in the country iv. Attention of different organization (CADP, ADS, UNNATI) v. Enough land area. potential for new plantation/ expansion vi. potential for new plantation/expansion vii. High potentiality for technology adaptation as improved dryers 	<ul style="list-style-type: none"> i. Declining labor availability ii. Drying out of water sources iii. Increasing trend of chemical pesticides usage instead of suitable organic method iv. Diseases and pest incidence
Marketing	
<ul style="list-style-type: none"> VIII. Good demand in national and international market IX. Increasing the awareness on value addition X. High demand in international markets XI. Large market potential within the country XII. Value addition possibilities through grading, tail cut, and smoke-free drying XIII. Attempt to diversify market XIV. Potential to employ large number of people 	<ul style="list-style-type: none"> V. Poor quality product resulting declining international reputation VI. Intense competition from neighboring countries VII. Political instability VIII. Division Forest Office has stopped its cultivation in community forest due to threat in biodiversity IX. High price fluctuation X. Invasion of duplicate cardamom in international market XI. Dependency on foreign market XII. Domestic consumption is very low (2 % or less)

5. Upgrading Existing Large Cardamom Value Chain

The upgrading of the product can be done with the management of various dimensions of market i.e. 4P's-product, price, place and promotion. The existing practices include a majority of traditionally cured, minimal graded and tail cut product which is available at NRs. 835 per kg. The local market, district (Phungling), and regional market (Birtamod) are the major trading routes with the major export market being India. Promotion of the product through the brand "Everest Big Cardamom" is underway. The major product upgrading strategies encompasses maximizing production and research suggesting commercially viable production, advance dryer promotion, technology transfer for tail cutting and national quality standards categorization. 10-15 % extra worth can be delivered by tail cut and graded cardamom. Potential international markets (third world countries) need to be explored and trading agreements finalized by the government sector for export with strict adherence to product promotion activities like setting national standards, organic certification and branding the product.

The process upgrading refers to the whole process from input supply to production, harvesting, post harvesting, and processing to marketing. Process upgrading regarding large cardamom in the study district shows two major steps for upgrading this product. Firstly, the cultivation process presently includes cultivation in private marginalized lands and community forests based on rhizomes from old stock-prone to disease and pests. This can be upgraded by

promoting seedlings based production from well managed nursery with adoption of good agricultural practices (GAPs) and good management practices (GMPs). Secondly, the manual harvest followed by various post harvesting practices includes traditionally cured, no grading and poor storage management. This practice needs to be upgraded through management of improved *bhatties*, adoption of grading (export quality standards), storage management and dissemination of technology (like technology for tail cutting and improved curing).

The functional upgrading of large cardamom value chain actors is one of the most important aspects of firm level upgrading strategies. In this study, four major actors with their present functions have been addressed for upgrading their functions. First, farmers can be upgraded through timely delivery of quality seedlings and associated inputs, incentive for replantation for disease prone cultivation, technical knowledge (GAPs, GMPs, quality standards, market information) and technology (improved dryer, grader, tail cutting, packaging material) insured for quality production. Second, village level traders can motivate farmers to learn more and practice drying and grading in addition to trading graded and tail cut products at higher value to district and regional markets. Third, district level traders need to motivate farmers and village traders for availability of final product (graded and tail cut LC) and Trade graded and tail cut product to other district and regional markets. Lastly, regional traders/exporters need to explore the international markets and export to third world countries along with enhancing capacity of national exporters/traders in expanding direct market access to the international markets.

The channel upgrading can be done in either of the ways- i) consensus development regarding premium price payment of processed product like tail cut, graded and smokeless cardamom or ii) existing channels of exporter who are exporting other high value products like coffee, tea, ginger exporters might be mobilized to include tail cut, graded and smokeless LC.

Inter-sectoral upgrading entails that the product or other remainings of LC could be used diversly for making papers and fiber utilized for making handicrafts. This practice has been initiated by establishment of cottage industries in the study area (Taplejung) by development organizations like HIMALICA. This can be further upgraded by exploration of potential for product diversification through research such as making papers and fiber utilized for making handicrafts.

Inter-firm upgrading can be assured through- “support to link traders and farmers to FLCEN (an umbrella organization to all the value chain actors) and even facilitate to form FLCEN district chapter and strengthen these district level units so that they would start taking care of all issues and concerns related to large cardamom in their respective districts. Consequently, this district chapter may become proactive for carrying out regional to national level policy issues.”

Business Development services and finance services can be upgraded in the light of access to finance, quality seedling, technology for tail cutting, research on scientific management in community forest and incentive for replantation. First, although the provision of advance payment from traders is in practice, increasing the product holding capacity of farmers through LC based loan provision from financial institutions needs to be assured. Second, limited and untimely availability of quality seedling is to be assured through timely availability, nursery management training and awareness on cultivation based on quality seedlings instead of old stock rhizomes. Ownership and strengthening of this mechanism through government sectors such as agriculture development section, PMAMP, CDC and NARC is a must. Third, the prevailing method of tail cutting through rubbing while curing (farm level) and using simple scissors (regional level) can be upgraded in a long run through associations with researchers in Institute of Engineering (IOE), Research Centre for Applied Science and Technology (RECAST), NARC, CDC etc. for identifying better technology for tail cutting. Fourth, research on scientific management in community forest is a must owing to depletion of natural forest, such as the *Alnus nepalensis* (Uttis), and interference in LC cultivation. Provision of land allocation for disadvantaged groups (DAG) regarding LC production has to be enhanced. Lastly, no incentive for replantation of old and disease prone orchards, except for limited technical support, has been found, which can be addressed through development of potential provision to compel agriculture development section and government agencies to provide incentive for replantation with detailed selection criteria and felt need.

There is neither any enabling policy for encouraging investments from private sectors nor state's significant support to the producers. Therefore, there has to be significant resource allocation from the government for the management

of LC nursery, capacity building through training, technical support, field visits, and incentives for replantation of disease prone cardamom gardens along with easy access for loan, price and market (local and export) regulation.

6. Discussion

The study suggests average area, production and productivity of the LC to be 1.08 ha, 202.86 kg and 187.83 kg/ha respectively. The similar status with production was found in Terathum district by Bhandari and Bhandari (2018) with 200 kg large cardamom production and 232 kg ha⁻¹ productivity from an average cultivation area of 0.86 ha, and average farming experience of 22 years.

In the study area, 31 % were adopting improved dryer while a study by Bhandari and Bhandari (2018) in Terathum district found that a- “relatively lower proportion, only 7 % of the farmers with access to improved LC drying facility, while traditional type of dryer was used by 93 % of farmers.” We observed the average days to curing in traditional *bhatties* is 1.37 days while that of the improved *bhatties* is 0.48 days while Deka, Biswas, Gopakumar and Potty (2003) reported 17-24 hours drying time with improved dryer and the volatile oil content of 2-2.4 %.

In this study, the relative seriousness of the problems faced during marketing of the cardamom followed the sequence of price fluctuation, more gap between farm gate and retail price, lack of marketing knowledge, poor transportation and distance to market. Similarly, according to Shrestha and Shrestha (2018), key problems of cardamom producers and traders were- “high price fluctuation, lack of disease-free saplings, dependency on Indian market, very old orchard, declining productivity, drying out water resources, adulteration, lack of research and extension support services, lack of favorable government policy and least coordination among the chain actors.”

The major actors involved in the value chain of LC in the study were farmers, local level collectors, district level collectors, regional level collectors and exporters similarly, Shrestha et al. (2018) identified the two major marketing chains in Sikkim district, India. In the study conducted in Terathum district, Bhandari and Bhandari (2018) suggested that, “the farmers responded 87 % of them selling their product to traders located in the district directly, while the rest of the farmers sold their product through the local collectors.”

7. Conclusion

Large cardamom is one of the major cash generating spice crops in Taplejung district. This district is the leader district in terms of area of cardamom cultivation and total production. However, this has been facing severe threat in recent years and its productivity is declining. Key problems facing large cardamom farming are pests and diseases, limited value addition, highly fluctuating market, and insufficient support services. The major marketing channel concentrates farmers to district level traders to the regional traders in Birtamod. The marketing channel is robust and district traders are lively involved but the weak coordination among the value chain actors is constricting the production and marketing of the cardamom sub-sector. Therefore, a new collective trademark, maintaining the quality standards, and pricing policy formulation and accreditation of Nepalese certifying laboratories to global standards could be a major priority. The focus on using recent scientific technologies like healthy seedlings, scientific grading mechanisms, improved dryers with efficient marketing channel and destinations would definitely help the large cardamom farming industry become competitive in the international spice market while conquering the “last mile” of the export process and could also help put an end to youth migration in search of employment opportunities from the hills to various countries. To that effect a series of recommendations are presented below:

- Ensure better and healthy seedlings for farmers and thereby improving productivity by advancing Good Agricultural Practices (GAPs) concentrating on disease-pest management
- Improve production and post-harvest practices of large cardamom through adoption of Good Management Practices (GMPs)- upgraded *bhattis*, transfer of tail cutting technology and storage management, to increase value retention.
- The practice of value addition activities, like tail cutting, grading (color and size) and packaging are currently negligible at both local and district level markets. A collective grading mechanism with strong adherence to export quality standards, therefore, needs to be promoted locally.

- Strengthening the coordination among marketing networks and institutions needs to be assured so that the fluctuation of price would be controlled and the quality standards be formalized.
- To further strengthen its effectiveness in global trading, a national large cardamom policy needs to be formulated and an institutional mechanism with private sector association needs to be created for sectoral coordination and promotional activities.

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