

Marketing and Value Chain Analysis of Mandarin at Joroyal Rural Municipality of Doti, Nepal ¹

Pawan Kathayat & Kiran Prasad Bhatta

Abstract

The yearly decline in mandarin production, one of the important citrus fruit in the mid-hills of Nepal could be attributed to underdeveloped and non-systematic market and lack of value-chain participation by farmers leading to low profitability and hence reducing their motivation. So, this research explores market and value chain of mandarin sub-sector through survey of 100 households from Joroyal rural municipality of Doti district using semi-structured questionnaires. Results showed that the average production of selected mandarin farmers is 1.8 Mt with income of Rs. 24,059 but considering family labor gross margins are negative. The dominant marketing channel is Farmers→Collectors, with around 92% of sales volume. Among the different types of collectors, local ones are dominant market players although price offered is higher for those coming from outside the district (Rs.58/kg) compared to local collectors (Rs. 50/kg), with producer's share being 40% and 35%, respectively. Monopoly of local collectors is high but for local relationship farmers are compelled to sell to them. Due to remoteness of the area, there are low/no value chain actors and hence marketing efficiency is also low. The major problem in marketing is found to be the low market price along with the unavailability of storage facilities or collection centers. Low networking of farmers is also contributing to reduction of the marketing efficiency and hence they are found not to be interested to scale-up their mandarin farms. Cooperative marketing may be one of the best options to increase the bargaining power of small-scale and scattered farmers.

Keywords: Citrus, Cooperative marketing, Marketing channel, Marketing efficiency, Value-chain actors

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Introduction

Citrus is one of the important cash crops for the hill farmers of Nepal (Budathoki et al., 2004; Adhikari et al., 2021). It is cultivated in kitchen gardens as well as in commercial scale. Unique topography and agro-climatic conditions of the mid-hills of Nepal have made it possible to cultivate different kinds of citrus fruits. Mandarin (*Citrus reticulata* Blanco) is an important citrus species covering a major part of the citrus growing area globally. Mandarin occupies 65.3% of the total citrus growing area and 67.2% of production in Nepal. It covers a total growing area of 32,188 ha among the cultivated land in Nepal and has a production of 311,188 Mt (MoALD, 2021). Doti is one of the 77 districts of Nepal, in the Sudurpaschim province, and the sub-tropical climate prevalent in 60% of the region of the districts which favors the cultivation of citrus crops like Mandarin (DADO, 2018). The productive area, production and productivity of mandarin within Doti district is 285 ha, 2497 Mt and 8.75 Mt/ha, respectively (MoALD, 2021).

Due to a number of technological limitations, the anticipated growth rate in the mandarin orange production is still negligible in Nepal. Despite the implementation of numerous plans and policies to boost production and productivity through the growth of commercial agriculture, performance of the mandarin orange sub-sector is still below the desired level. The area of mandarin and its production in Doti district is hovering around the same number from past several years. The production is within the range of 2300-2500 Mt/ha since six years (MoALD, 2021). Despite their willingness, farmers are afraid of expanding the mandarin cultivation. Marketing was one of the major problem reported by several previous researchers (Baral et al., 2021; Sharma et al., 2021). There are numerous types of middle-men working in agriculture marketing chain viz. collectors, assemblers, pre-harvest contractors, etc. that are the only option for sales due to some sort of monopoly and farmers inability to sell directly to consumers or wholesalers in bulk. Compulsiveness of farmers to sell their produce at lowest price offered by the middle-men is thus the main reason behind farmers reduced profitability and hence reduced motivation for mandarin farming (Sharma et al., 2021). Though middle-men are important for every agriculture produce marketing they come with several negative impacts and hence are usually criticized for their larger share in consumer's price although the farmers are the one who had to work hard and wait long for their harvest (Joshi & Gurung, 2009). They are also hesitant on spending on recommended practices of Mandarin due to limited opportunities to expand their income although there may be a lack of knowledge and information on those practices which could be another issue in adoption. Extension programs and services have not yet targeted the mandarin growers to the extent it is needed. There is lack of market information among the growers. Lack of agricultural produce collection center is creating problems for easy marketing of the

produce. Due to lack of enabling environment along with inefficient markets the mandarin production in Doti has not been able to excel upto its potential. No study has been carried out on market chain of mandarin orange to identify the key constraints and potentiality of improvement on the sector in Joroyal, Doti district.

This research is designed to analyze the citrus market and value chain and identify the problems and contribute to better implementation of future program for development of fruit enterprise in the district. The study will provide information about production and marketing dynamics of mandarin in Nepal. The data obtained will help in the development of value chain of mandarin in Doti and may help in building strong agribusiness system within and outside the district.

Methodology

Site selection and sampling

This research is conducted in Doti district which represents the mid-hill region of Nepal and has the high potentiality of mandarin cultivation. The district is located in the Sudurpashchim (Far-Western) Province. The total population of Doti is around 211,746 (as per 2078 census) of which 80% are engaged in agriculture (CBS, 2022). The study was conducted in Joroyal rural municipality because of its high share in production of mandarin within the district. It is also one of the working site of Prime Minister Agriculture Modernization Project (PMAMP), Project Implementation Unit (PIU), Citrus Zone, Doti. Accessibility of this rural municipality also positively impacted its purposive selection for sampling. The study population was the mandarin growers which was obtained from PMAMP Citrus Zone office at PIU, Doti. The sample size was determined using following equation (Eric et al., 2014) which is used when the actual population size is unknown:

$$\eta = \frac{p(1 - p)Z^2}{e^2}$$

Where,

n = sample size

p = population proportion (= 0.50)

e = acceptable sampling error (=10% = 0.10)

Z = z-value at 5% significance level (=1.96)

The sample size comes to be slightly more than 96 using the formula. Around 4 samples were added for nonresponse, thus making the total sample size of 100 respondents. They are selected randomly from the list of mandarin growers available at the PIU, PMAMP, Citrus Zone Office, Doti.

Data collection techniques

The primary data was collected from mandarin farmers within the study area by using research instruments like household survey, Key Informant Interview (KII), market

appraisal and field observation. The household survey was conducted by face-to-face interview of mandarin farmers using a semi-structured questionnaire. These questionnaires were pre-tested on 5 non-sampled households nearby the sampling sites before initiation of the survey and necessary modifications were done in the questionnaire based on the feedback from these pre-testing survey. KoboCollect mobile application was used to collect data directly into the mobile application. Respondents were interviewed with questions seeking demographic, educational, sociocultural, economic, and other information regarding the production, marketing and value chain participation in mandarin sub-sector. These information were helpful to understand the marketing system, value chain opportunities and problems in the study site.

In addition, for collecting some information regarding marketing and value chain of mandarin, Key Informant Interviews (KII) were also conducted to collect data/information from other actors of the marketing channel / value chain viz. collectors/assemblers, wholesalers, retailers and officers and technical personnel of PMAMP who had well knowledge and experiences on the subject matter. The information obtained from the KII was used in verifying the quantitative information obtained from the household survey as well as for some qualitative analysis. The data on price and quantity buying and selling, pricing system, means of packaging, transportation, storage facility, marketing margin and marketing cost and marketing constraints were also collected from the trader (collector, wholesalers and retailers). Besides, field observation was done at different times in the site to witness the situation which was useful in verifying the information from the household survey. Direct field observation was done at the time of field survey to know the number of bearing trees, and other management condition of orchard.

Data analysis techniques

The collected data were downloaded directly into the Microsoft Excel computer software where it is refined and cleaned. Inconsistencies in data were looked for and removed where necessary. The qualitative data were either analyzed qualitatively or further quantified to carry out the quantitative analysis. The collected quantitative data were analyzed using both descriptive and analytical techniques. For the descriptive analysis of the study area and population, different variables like size of family, economically active population, education level, caste, size of land holdings were included. They were analyzed by using descriptive tools such as frequencies, percentage and mean as per the need through Microsoft Excel. Value Chain Mapping along with their inter-dependence was done mostly from qualitative data and data obtained from both household survey as well as KII with other value chain actors. Data analysis was done as follows:

Social and demographic variables. Social and demographic variables like family size, age distribution, gender distribution, educational status, land holding, land holding size, productivity, etc. were analyzed using descriptive statistics like averages, ranges, minimum and maximum values, standard deviation, frequency tables, bar diagram, pie chart, etc.

Cost of production. Cost of production was calculated by addition of all variable costs in the production process. The variable cost (Total Variable Cost or TCV) included were fertilizer cost, manure cost (Farm Yard Manure or FYM), labor cost, insecticide/pesticide cost (usually Bordeaux paste is only used), which are the major variable inputs. Total cost was calculated by summing all the variable cost items. However, for reference purpose tentative fixed costs were also estimated.

Cost of production was calculated with the consideration of variable cost of production (Karki, 2018; Pokhrel, 2011; Gautamet al., 2020; Regmiet al., 2020). The variable costs were only considered due to perennial nature of mandarin (Pokhrel, 2011), which makes it difficult to attribute it to any single year. The payback period of fruit farm was found at 9-10 years of age (Bhandari&Aryal, 2016). The orchards at the study site were mostly above 10 years of age. Hence, fixed costs were not considered during the calculation of the cost of production.

$$\text{TVC} = \text{Labor} + \text{FYM} + \text{Chemical Pesticides} + \text{Fertilizer}$$

Gross margin analysis. The gross margin of any particular crop enterprise is defined as the difference between gross returns and the variable expenses attributable to that enterprise (Parajuleet al., 2021). Following equation was used for this purpose:

$$\text{Gross Return} = \text{Total Production (or Sales) of Mandarin} \times \text{Average Market Price}$$

$$\text{Gross margin} = \text{Gross Return} - \text{Total Variable Cost} (= \text{Profit/loss})$$

Marketing margin. Marketing Margin is the difference between the net price received by the farmer and the price paid by the consumer (Acharya & Agrawal, 1999; Baralet al., 2021). Technically, it is the difference between Retailer's Price (Pr) and Farm-Gate Price (Pf).

$$\text{Marketing Margin} = \text{Retailer Price (Pr)} - \text{Farm-Gate Price (Pf)}$$

Producer's share. Producer's Share (Ps) is the price received by the farmer expressed as a percentage of the retail price, that is, price paid by the consumer (Acharya&Agrawal, 1999; Baralet al., 2021). Mathematically, it is expressed as follows:

$$\text{Ps} = \frac{P}{P} \times 100\%$$

Benefit-cost analysis. Benefit-Cost analysis is the simplest method to analyze economic performance of any enterprise. It measures the amount of return per unit of input cost, which is estimated using following formula for Benefit-Cost (B-C) Ratio (Pokhrel, 2011):

$$\text{B-C Ratio} = \frac{G}{T} \frac{R}{V_i} \frac{C}{C}$$

Indexing of production and marketing problems. Scaling method gives the way and attitude of the respondents towards propositions. Farmers opinion on the importance given to the different production and marketing constraints/problems were analyzed by using 5 point scale of constraint/problems comprising the least serious, a little bit serious, moderately serious, serious and the most serious by using 1, 2, 3, 4 and 5 Likert scales, respectively (Miah, 1993). The index of importance was computed by using the following formula (Baralet al., 2021):

$$I_{\text{imp}} = \frac{\sum Si fi}{N}$$

Where,

I_{imp} = Index of Importance (Seriousness of Problem)

\sum = Summation

Si = Scale Value

fi = Frequency of Importance (Seriousness) Given by the Respondents

N = Total Number of the Respondents

Results and Discussion

Socio-economic characteristics of the surveyed households

In the study area, 77% of the household were found to be headed by males while only 23% of them were female (Figure 1). The result is different from the national statistics showing population. Though it should be noted that it is related with overall population and not only the gender of the household heads. As per the national statistics, the percentage of male (48.96%) out of total population is lower than that of female, which is 51.04% (CBS, 2022).

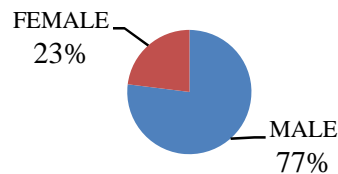


Figure 1: Gender of the household heads

For ease in understanding age of the household head was divided into five categories but there were no household heads younger than 15 years so there are four categories remaining (Figure 2). The results shows that majority of heads are of the age 30-45 years (37%) followed by 45-60 years (35%). Below 30 years (15-30 year age category), there are 19% household heads and above 60 years there are only 9%. It shows that most of the farmers are of young and active age, which is a good sign for mandarin sub-sector.

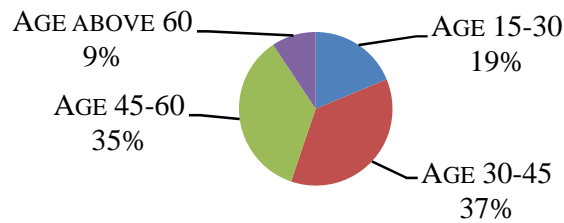


Figure2: Age of the household heads

Mid-hills of Sudurpaschim province is categorized by dominance of Brahmin, Chhetri and Thakuri communities, which is also reflected in the results of this research (Table 1). In the study area, Chhetris(77%) were the dominant ethnic group. This is followed by Brahmins (9%), and Thakuris (7%). Dalits are meager 5% and Janajati even lower at 2%. The dominance of Chhetri ethnic group in the study area is similar as its dominance nation wise. Chhetri is the largest ethnic group having 16.45% of the total population in Nepal (CBS, 2022).

Table 1

Ethnicity of the householdheads

Ethnicity	Percentage
Chhetri	77
Brahmin	9
Thakuri	7
Dalit	5
Janajati	2

The average family size of the household in the study area was found to be 6.61, with families have only 2 members and up to 16 members (Table 2). It is more than the national average of 4.32 (CBS, 2022) and may indicate presence of joint families due to the fact that joint families are still predominant in the rural areas. Similarly, the average number of females in the household is around 3.19 (1-8) and males is around 3.42 (1-10). The economically active populations in these households are also high averaging around 2.58 males and 1.95 females.

Table 2

Population demographics of the surveyed household

Description	Average	Maximum	Minimum	S.D.
Number of female in family	3.19	8	1	1.39
Number of male in family	3.42	10	1	1.55
Number of economically active females	1.95	5	0	0.97
Number of economically active males	2.58	8	1	1.11
Family size	6.61	16	2	2.59

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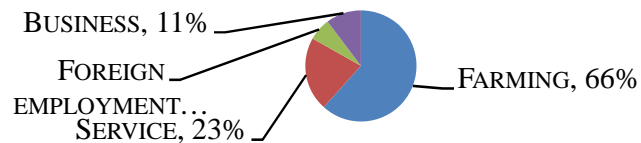
Note: S.D. = Standard Deviation

There exists a relationship between the educational status of farmers and agricultural productivity. As per the survey conducted by World Bank in 1992 in low-income countries farmers with basic education were found to be 8.7% more productive than farmers with no education. The study conducted in Nepal also suggested that agricultural productivity can be enhanced primarily by improving farmer's decision-making ability (Eric et al., 2014), which in turn is enhanced by educational level. In this study, most of the household heads were educated and only 11% were illiterate (Table 3). The illiteracy rate was found to be lower than that of study conducted in Thulung Dudhkoshi and Dudhkoshi RMP of Solukhumbu district that was found to be 24% (Pant et al., 2019). Moreover, more than 57% are just literate and able to read and write and perform simple calculations; 13% had completed 10 years of schooling and 15% had completed 12 years of schooling. Only 4% of the heads have bachelor or higher degrees.

Table 3***Educational status of the household heads***

Educational status	Percentage
Illiterate	11
Literate	57
SLC passed	13
10+2 passed	15
Bachelor and above	04

Farming was the major source of income among the households (66%) of Jorajal rural municipality (Figure 3). It is followed by service sector (23%), business sector (11%) and foreign employment (7%). The obtained result supports the statement that the two-third of the population of the country is involved in agriculture (Sah, 2019).

**Figure3: Major source of income**

The mean land holding size of the surveyed households were 25.5 ropani, which is more than national average land holding size (Table 4). The average landholding per family in Nepal is less than 0.68 ha (Timilsina et al., 2019). It is also higher than the obtained result of 17.99 ropani from overall sampled households of the Parbat and Baglung districts of Nepal (Baral et al., 2021). The higher land holding is mainly due to

the nature of the farming area in such a hilly district, as it comprises not only plain farming land, but rather sloped small hilly areas as well (known as Pakho land). On the other hand, the average mandarin cultivated land was around 9.19 ropani, with minimum of 1 ropani and maximum of 100 ropani.

Table4

Total land holding of the household

Description	Mean	S.D.	Minimum	Maximum
Landholding size (ropani)	25.50	48.49	1.00	300.00
Mandarin cultivated land	9.19	19.07	1.00	100.00

Cereal crops (58.3%) was the major agriculture commodity cultivated by the sampled households, both in terms of area and production followed by animal husbandry and mandarin is only the third major commodity (Figure 4). This signifies that farmers still prefer cereal crops may be due to their concern for household food security. Cereal crop was also found to be the major agriculture commodity in a study carried out in Saptari, a terai district of Nepal. The percentage of household who cultivated cereal as a major commodity was 49.2% in Saptari district of Nepal (Shrestha et al., 2020).

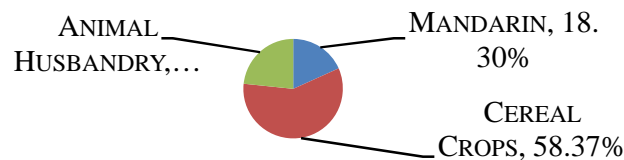


Figure 4: Major commodity of agriculture adopted by the households
Status of Mandarin Cultivation

All of the surveyed households have at least a ropani of land dedicated for mandarin, with average of around 9.19 ropani (Table 5). Again, they have at least a couple of mandarin trees (minimum of 4 trees) with average of 94 trees and a maximum of 520 trees. The average number of mandarin plants per households is lesser than that of in Parbat and Baglung district, around 270 per household (Baral et al., 2021). Out of these around half seems to be bearing trees that produce fruits. The number of fruiting tree per household is similar with the result obtained in Kaski district by Karki (2018) where the number of fruiting tree per household is 55. Average fruit production per season per household is around 1.79 Mt and sales amount to be around 1.39 Mt per households.

Table5

Status of mandarin production within study area

Description	Mean	Minimum	Maximum	S.D.	Sum
Total number of mandarin trees	93.68	4	520	103.01	9368
Number of fruiting trees	44.75	2	250	56.25	4430

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Total production (kg) *	1,794.19	50	9,000	1,924.45	177,625
Sales **	1,395.10	20	7,200	1,558.86	135,325
Area of cultivation in ropani	9.19	1	100	19.054	919

Note: * Estimates from 99 households Estimates of 97 households**

Most of the mandarin orchard seems to be of 5 years or more age, which means that they are already producing fruits for consumption. Only 2% of the orchard seems to be newly established (Table 6). Around 51% is more than 5 years old but less than 10 years old and remaining 47% is more than 10 years old orchards.

Table 6

Age of mandarin orchard

Age of orchard	Households
1-5 year	2
5-10 year	51
Above 10 year	47

In the study area, 88% of the households practiced intercropping in the mandarin orchards while 12% of the households didnot practice intercropping (Figure 5). It enables farmers to earn additional income utilizing vacant spaces from the same piece of land (Maitraet al., 2019).

Better harvesting from the intercropping depends on the choice of crop. Short duration vegetables that are bushy or climbing types with shallow roots and plant height are ideal companion for large fruit trees. These are the best inter crops in terms of per unit area productivity and profitability when compared with cereals, millets or any other crop. Yield benefits are obtained if there exists perfect crop combination (Maitraet al., 2019). Nearly half of the household (57%) intercropped with cereals followed by vegetables (14%), ginger/turmeric (10%) and legumes (7%).

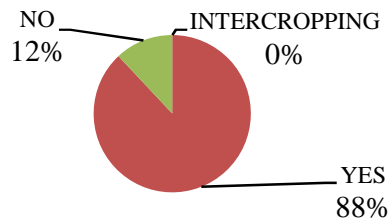


Figure5: Intercropping in mandarin orchards

The variable cost of production per ropani was found to be Rs. 3,467.28 (Table 7). Among different cost categories, cost of FYM was the highest (Rs. 1,733.10) and it is being used by all of the households. It is followed by labor (Rs. 1,294.08) costs, which is provided mostly by family members and hence not used in profitability analysis in this research due to the fact that its inclusion will result in almost losses in every household.

It also shows that agriculture does not pay well in case of Nepal. Only 14% of the households were found to be using Bordeaux paste and the average cost among using households is Rs. 532.85 and 26% of the households were found to be using chemical fertilizers with average cost of Rs. 251.92. Farmers in the surveyed area were found not to be using chemical pesticides and hence costs for it is zero. The cost of production is almost similar to the cost incurred in Nirmalpokhari (Rs. 4427.48/ ropani) of Kaski district which also considered only variable costs (Karki, 2018). A study conducted in Gulmi district in 2020, calculated the variable cost to be Rs. 12,414.28 per ropani among the commercial producers of Dhurkot, Chhatrakot, Gulmidurbar and Resunga (Gautamet al., 2020). The higher cost of production might be due to higher amount of input used in these areas where farmers are found to use micronutrients, vermin-compost, etc. Expenses done by the household amounts to be around Rs. 34,729.78 (or Rs. 19,214.20 if cost of labor is not included which is mostly the family labor cost calculated based on existing market labor rate), which results in loss of around Rs.10,670.55 (or profit of Rs. 4,844.65, if labor costs are not included). Similarly, the B-C ratio of mandarin cultivation was found to be 1.42 (excluding labor costs). The findings showed that the mandarin cultivation is a profitable enterprise though it is only slightly higher than unity, which might be the reason of non-satisfaction of most of the farmers.

Table 7**Calculation of variable cost of production per annum**

Particulars	Amount (Rs./ropani)	Amount (Rs./household)
Cost of FYM	1,733.10	17,140.60
Cost of Bordeaux paste *	532.85	6,679.29
Cost of fertilizer **	251.92	4,378.85
Cost of labor	1,594.08	15,515.58
Total variable cost	3,467.28	34,729.78
Total variable cost without labor	1,873.20	19,214.20
Total income	2,617.94	24,058.85
Profit/loss (gross margin)	-849.34	-10,670.55
Profit/loss (without labor costs)	744.74	4,844.65
B-C Ratio		1.42

Note: * Used by only 14% of the household and averages are for the households using it; ** Used by only 26% of the household and averages are for the households using it

Satisfaction level of mandarin producers with their mandarin enterprises was analyzed to understand the performance of this sub-sector. Most of the farmers seems to be unsatisfied by their mandarin business since none of them are fully satisfied and only

around 17% are moderately satisfied (Figure 6). All others expressed average or lower level of satisfaction towards mandarin enterprise.

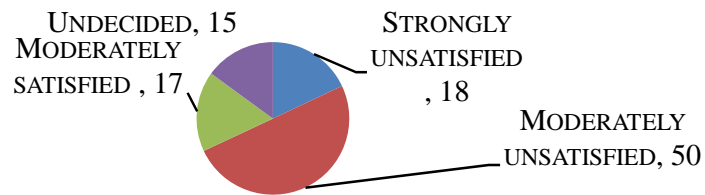


Figure 6: Satisfaction level of growers in relation to production

Analysis of Mandarin Market

In the study area, farmers have relatively less access to market information outside the district. However, almost all of the households said that they have knowledge about local market (Table 8) and neighbors, relatives and friends are the source of these information (96% cases) followed by news from different medium. The percentage of households who are involved in some form of local farmers group, associations or cooperatives are as much as 52%, which may also had helped disseminate information from one farmer to another. This may also signify that farmers are making efforts for collective procurement of inputs, production and marketing.

Table 8

Source of market information

Source of Market Information	Percentage
Relatives and friends	96
News	4
Affiliated with local groups / cooperatives / associations	52

The quantity of produce actually sold in the market after accounting for losses and retention by the farmer is marketed surplus. Out of the total produce, 71.42% was actually sold by farmers in the market while, 12.30% of the produce was lost while harvesting and storage and 16.27% of it was used by households for household consumption (Table 9).

Table 9

Marketed surplus in the study area

Particulars	Quantity (kg)	Percentage
Total production	177,625	100.00
Loss while harvesting, transportation and storage	21,858	12.30
Household consumption	28,900	16.27
Marketed surplus	126,867	71.42

The price earned by farmers depends on the production volume, channel used for sale, their bargaining power etc. Due to high differences among the surveyed households, the price received by them is also highly diverse with a minimum of Rs. 30/kg and up to Rs. 70/kg (Table 10) with average of Rs. 52.62/kg. As per the study conducted in Dailekh district in 2019, the maximum and minimum price was found to be Rs.55/kg and Rs.45/kg respectively (Regmi et al., 2020). Similarly, as per the study conducted in Baskharka VDC of Parbat district, the average price received per kg of mandarin was found to be Rs.80.5 and Rs.102.5 in 2018 and 2019 respectively. The price is considerably higher because of the easier access of farmers to Pokhara, a major market of the mandarin (Panth & Dhakal, 2019).

Table10***Price received by farmers***

Description	Price received (Rs./kg)
Minimum	30.00
Maximum	70.00
Mean	52.62
S.D.	8.58

Mostly, non-contractual marketing system is prevalent in the study area. Two forms of marketing channels were prevalent within the rural municipality: (i) Farmers → Collectors → Wholesalers → Retailers → Consumers and (ii) Farmers → Consumers. Around 73% of the farmers sold their produce only to the collectors (Table 11), though both local collectors and collectors beyond the district. Again, 18% of the farmers sold directly to the consumers only. Whereas farmers selling to both of them account for around 8%.

Table 11***Marketing channel prevalent in the study area***

Marketing channel	Percentage
Farmers → Collectors → Wholesalers → Retailers → Consumers	73.33
Farmers → Consumers	18.33
Both	8.33

In the study area, of the total sales volume 53.52% of the marketed surplus is sold to the local collector and 37.83% to the collector beyond the district (Table 12). Consumers visiting the farm buy around 8.64% of the total volume of mandarin sold by the farmers. Since the road facility has recently been started in the rural municipality, it has been quite easier than before for the marketing of mandarin. Collectors were having easy access to the villages than before. Sometimes collector from beyond the district like Dadeldhura, Attariaya, Dhangadhi, etc. also visits the rural villages for buying local mandarin. However, as per the farmers, monopolizing behavior of local collector is

hindering their access to the full potential. Average price received by farmers on selling their produce to local collectors, collectors beyond district and consumers were Rs.50, 58 and 75 per kg, respectively. Farmers were offered higher prices by collectors beyond the district. Also, they charge higher to consumers visiting their farm.

Table 12

Quantity of produce sold through various channels (based on sales volume)

Particulars	Quantity (kg)	Average price (Rs./kg)	Percentage
Local collectors	67,900	50	53.52
Collector beyond district	48,000	58	37.83
Local consumers	10,967	75	8.64

The difference between the farm gate price and retailer's price is the marketing margin (Shrestha et al., 2020). It determines the efficiency of the marketing system. In case of farmers selling directly to the consumer there is no case of such analysis. However, the marketing margin on selling to local collector and collector beyond district was analyzed (Table 13). The results showed that market margin is higher for local collector (Rs.95/kg) compared to collector beyond the district (Rs.86.98/kg), with producer's share better off in case of latter (40.01% compared to 34.48% in case of local collector). This shows that farmers had lower bargaining power on dealing with local collectors or they try to monopolize the market with every means. This is also due to the dependency of farmers mostly on local collector for the marketing of mandarin along with other commodities. Farmers cannot travel to distant markets due to lack of transportation. For maintenance of relationship with local collectors they may be compelled to compromise on the price received.

Table 13

Calculation of marketing margin and producer's share

Channel	Farm-gate price (Rs/kg)	Marketing margin (Rs./kg)	Retail price (Rs./kg).	Producer's share (%)
Local collector	50.00	95.00	145.00	34.48%
Collector beyond district	58.02	86.98	145.00	40.01%

Value chain mapping

Value chain mapping is a visual illustration of the chain and describes all activities and linkages among the value chain operators and supporters (Gyeltshen, 2015). Value Chain Mapping of the mandarin sub-sector is illustrated below (Figure 7).

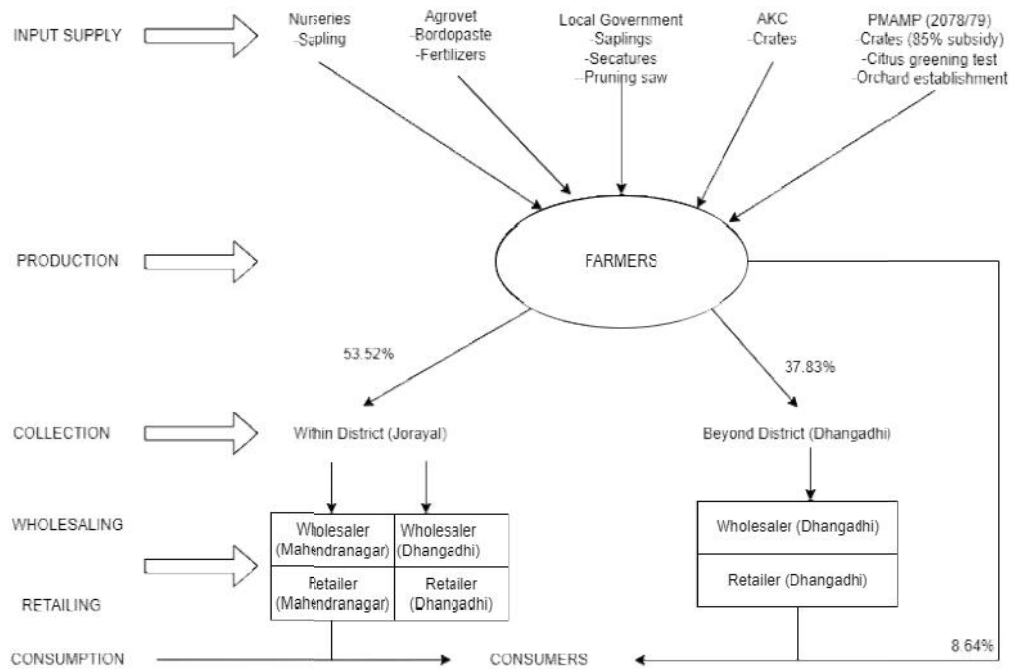


Figure 7: Value chain mapping of mandarin sub-sector in Jorayal rural municipality

Producers in the study area were also facing several problems related to efficient marketing and value chain participation. Six major problems were identified and were prioritized, in this regard (Table 15). Indexing of problems showed that low market price was the most prioritized issue by the farmers (with the index value of 0.73). Other problems identified are lack of storage facility (0.71) and lack of collection center (0.64). Farmers are also having problems due to their low capacity to network with diverse buyers. For instance, none of the farmers are found to be selling to wholesaler, pre-harvest contractors or retailers. This might have reduced options for bargaining for the better price. Lack of market information and transportation were also identified to be other problems in marketing and value chain participation by the farmers.

Table 15

Problems in marketing and value chain participation of mandarin sub-sector

Marketing and value chain problems	Index	Rank
Low market price	0.73	I
Lack of storage facility	0.71	II
Lack of collection center	0.64	III
Limited capacity of farmers to have relation with diversity of buyers	0.61	IV

Full text can be downloaded: <https://www.nepjol.info/index.php/craiaj> & <http://www.craiaj.info/>

No information on market strategy	0.48	V
Transportation facilities	0.32	VI

Conclusion

Citrus is one of the important fruit crops of Nepal and mandarin is among the most popular fruit in the citrus group. It is usually cultivated throughout the mid-hills of Nepal and Doti is not an exception. However, in recent days the production of mandarin is declining due to several problems. Some of the major issues are declining yield, underdeveloped market, lower producer's share, higher market margin, lower scope of farmer's participation in the value chain. This research endeavors to analyze the mandarin market and value chain in order to explore the current scenario and problems of marketing and profitability from the mandarin sub-sector. Joroyal rural municipality of Doti district was selected for this purpose. Altogether 100 households were selected for survey through pre-tested semi-structured questionnaire with the help of KoboCollect mobile application. Again, KII were also conducted with some of the value chain actors, especially traders, wholesalers, retailers, etc. The collected data were refined and cleaned after downloading it on Microsoft Excel computer software and thereafter analyzed using mostly descriptive methods.

Results showed that around two-third of the households are dependent on agriculture for their livelihoods. The mean land holding size (around 25.5 ropani or around 1.25 ha) is slightly higher than national average of around 0.68 ha. Not all of these land is used for mandarin cultivation but the average size of mandarin orchard was found to be around 9.19 ropani (0.45 ha) with as low as 1 ropani to a maximum of 100 ropanis. The total number of mandarin trees per household is around 94 (ranging between 4-520 trees) out of which around 45 are bearing (ranging from 2-250 trees). Most of the orchards are older than 5 years (around 98%) and already have started bearing the fruits. Average production per household is 1.8 Mt and sales is around 1.4 Mt. The cost of cultivation is around Rs. 3,467 per Ropani (or Rs. 34,730 per household or Rs. 19,214 per household if cost of labor is excluded) with highest share of FYM followed by labor whereas farmers are found not to be using any chemical pesticides. The income from mandarin is around Rs. 24,059 per household and mostly the farmers are not satisfied with the mandarin enterprise since if the labor costs are accounted there will be a loss of Rs. 10,671 (even if labor cost is excluded the profit seems to be around Rs. 4,845 per household only). The average price obtained by the farmers is Rs. 52.62/kg and there is a high discrimination in price from Rs. 30-70/kg. The B-C ratio for mandarin enterprise comes out to be 1.42, which shows that the business is only moderately profitable with

one-half times income compared to expenses (B-C ratio will be less than 1 if labor costs are included).

Farmers are found mostly to have no authentic source of information regarding any issues of mandarin, including market information and they mostly rely of friends and relatives in their neighbors. Although half of them are affiliated with local groups, association or cooperatives but still they lack proper information sources and exchange within members is only the major source of such information. Farmers sell their produce to either collectors, both local and from other districts (around 73.33%) or directly to consumers (18.33%) or whoever visits their farm (8.33%). This shows that they have little networking with other potential buyers. The volume of sales is highest for local collectors (54%) followed by collector beyond the district (38%). Consumers or others visiting their farms buy around 8-9% of their products. Hence, Farmers→Collectors is the predominant marketing channel in case of mandarin sub-sector atDoti. Price offered was though highest from the consumers that directly visit their farm (around Rs. 75/kg) whereas lowest for local collector (Rs. 50/kg). Collector from outside the district offer slightly higher price of Rs. 58/kg but the monopoly of local collector is high and for local relationship farmers are compelled to sell to them. As would be obvious, marketing margin is highest in case of direct sales to consumer but if it is excluded collector beyond district offers larger producer's share (40%) and lower market margin (Rs. 87/kg) whereas local collector offer less than 35% share to producers and takes higher margin up to Rs. 95/kg. Due to relatively remote area there are little value chain actor in the surveyed site and hence marketing efficiency is low. Farmers are also using inputs from their own production like FYM and saplings. External input use is minimum and for urgency only. The major problem in marketing as perceived by the farmers is the low market price and unavailability of storage facilities as well as collection centers. Low networking of farmers, lack of information and lack of transportation as well as its high cost is reducing the marketing efficiency.

The climate and topography of most of the mid-hill regions, including Doti districts, is highly favorable for mandarin production. Although it has been cultivated by the farmers themselves throughout the Nepal, the mandarin sub-sector has been facing constant challenges due to several biotic and abiotic factors thereby reducing its charm. Farmers are also facing several other challenges and threats that could be detrimental for this sub-sector and hence timely attention from relevant stakeholders is a must. Most of the farmers in this region are not even using simple practices like application of Bordeaux paste and essential micronutrients, use of intercultural practices like training and pruning, etc. They are also using local saplings produced at their farm. There are little or no organizations supporting them financially or technically. Marketing and value chain participation is also very low and is in rudimentary phase due to low networking

and inefficient market system. Intermediaries like local collectors dominate the market and there is low scope for value chain participation. Profit of farmers are highly reduced by it and farmers are found to be little interested to scale-up their mandarin farms. It would be better if there are authentic suppliers of saplings and farmers use it along with other recommended inputs, technologies and practices, which can also be facilitated by government and other development organizations working there. Establishment of local groups, association and cooperatives and enhancing their skills and capacities is also required. Cooperative marketing may be one of the best option to increase the bargaining power of small-scale and scattered farmers. Government could also invest on infrastructures, roads, transportation, storage facilities and providing training and technical support to the farmers if this sub-sector is really contribute to the national economy.

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