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COMPETITIVENESS OF SWEET ORANGE VALUE CHAIN IN SINDHULI DISTRICT, NEPAL

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ABSTRACT

Government of Nepal declared sweet orange super zone in Sindhuli for increasing the productivity and better commercialization of product. This study analyzed sweet orange value chain in Sindhuli with the aim of identification of major value chain actors along with value chain competitiveness, structure, conduct and performance. A Survey was done with 150 producers, 5 retailers and 4 agro vets, 8 banks and co-operatives, 2 processing industry and 2 nurseries using random sampling method in 2021. The findings revealed the involvement of two channels in value chain stream of sweet orange. A total of 17% was transacted through first channel via collectors and second channel transacted 83% of fruits via local traders. Sweet orange market was found oligopolistic along the chain. The business was found profitable with B/C ratio 1.37 in study area. Relatively better institutional set up on extension services, better technological adoption rate was driving factors for profitability. Value chain stream of Sindhuli had better market margin, market efficiency and value addition. Policy efforts to strengthen local institutions, insurances, market information and credits are recommended to improve performance of value chain. Processing and value addition of sweet orange should be of concern to government for enhancing export potentiality.

Keywords: Benefit-cost ratio, Super zone, Sweet orange, Value addition, Value chain

INTRODUCTION

Sweet orange (*Citrus sinensis* Osbeck) holds significant economic, nutritional and religious worth in Nepalese context (Ghimire *et al.,* 2006). Sweet orange production is one of the profitable agribusiness in Nepal with the B/C ratio 1.58 and financial rate of return 28.45% (FDP, 2017). This fruit is cultivated in 54 out of 77 districts of Nepal with both cultivated area and the fruit production continuing to increase every year (Kaini, 2019). *Junar* is the popular variety of sweet orange grown in Nepal (Shrestha, 2016). The mid-hill region (1000 meter to 1500-meter altitude) has a comparative advantage in the cultivation of citrus fruits especially mandarin and sweet orange (Subedi *et al.,* 2002; DADO Sindhuli 2010). Sindhuli is the major sweet orange growing district and is located in the Banepa-Bardibas road corridor. Sindhuli lies on the mid-hill area which favors for the commercial sweet orange cultivation. Sindhuli, is recognized as a “super zone” of sweet orange under

the Prime Minister Agriculture modernization project (PMAMP) which emphasizes the potential of the district or higher scale commercial cultivation.

Nepal in the recent years designing the various plans and policies for addressing the food security and poverty, enhancing the export potentiality of different crops including citrus fruits were launched (World Bank, 2017). Considering the facts, adjoining districts of Banepa- Bardibas road corridor are the major hubs for the sweet orange production inside the country. Sindhuli district lies on the corridor of national road linkage, can significantly impact on the marketing of the fruit. But, quality standards product from the India, absorbs the Nepalese market and creates the serious problems to the producers, value chain actors and enablers.

Competitiveness is the capacity of the producer to produce and market a commodity more efficiently than their competitors, whether at firm level (micro) or the national level (macro). In macro-economy level, it is the ability of nation to export goods and services through the efficient use of production resources (Joshi, 2018). Competitiveness is the ability of a national economy to achieve sustained high rates of economic growth, as measured by the annual change in gross domestic product per person and also the ability to create added value and thus increase national wealth.

In this context, the value chain concept plays important role in understanding how value is added to product at different stage from production to consumption. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and value is added. Value addition results from diverse activities including bulking, cleaning, grading and packaging, transporting, sorting and processing (Anandajayasekeram & Gebremedhin, 2009).

Value chain analysis is a tool that is used to identify and explore development opportunities, looking at each distinct step in the life of a product, the actors at each step, how value is added, and how much they earn for that value created (Piper, 2007). The value chain therefore connects the different related business activities (production, transformation, marketing, etc.) necessary for serving customers. These activities link and co-ordinate the enterprises (primary producers, processing industry, traders, etc.) performing these business activities (GTZ, 2007).

Structure-Conduct-Performance (SCP) model is a popular analytical tool used to evaluate market competitiveness and performance in relation to how market structure effect business conduct and performance. This model has gained popularity through the work of Michael Porters' Competitive Strategy in 1980 (Porter, 1980). SCP shows how productive activities are brought in harmony with demand of goods and services through existing market mechanisms and how variations and imperfections of markets affect the success achieved to satisfy economic wants. This model provides the linear picture of the structure and framework to the value chain describing how structure and conduct of market impacts on performance of value chain (Attaie & Fourcadet, 2003). Performance of actors depends on the conduct of buyers and sellers. Conduct consecutively depends on the structure of the relevant market, while market structure is affected by the basic conditions regarding supply and demand. In addition, the model is completed by the role of public policies, which usually have an impact on conduct and market structure through different types of intervention (Viaene & Gellynck, 1995).

Sweet orange growers are facing the problems like; lack of information on market price, mal practices of the marketing intermediaries as they manipulate the price of the product for the pursuit of more profit margin, poor linkage with the enablers and other key actors (Sharma,

2006). Very few researches which produce the significant impact on the competitive value chain management on the sweet orange has been undertaken in the study area. This study plans to improve the information base on marketing performance, competitive value chain, pursuing and providing the scope of export potentiality of fruit and factors affecting value chain on sweet orange production in study area. This research will be crucial to identify the critical success factors of value chain competitiveness. The study will come up with the possible recommendations after the investigation of the competitiveness of the value chain and market performance supported with the Strengths, weaknesses, opportunities and threats of the value chain enablers and actors. The study aims for the identification of major chain actors involved in sweet orange value chain along with the market structure and marketing performance.

MATERIALS AND METHODS

Site selection, sampling and sample size

Sindhuli lies in the mid hill region located across Banepa-Bardibas road corridor with having the high potential for sweet orange production contributing about 24.15% of total production of Nepal. Sindhuli district is situated within 27.2569° North latitude and 85.9713° East longitude with the elevation ranging from 614 to 7,227 meter above sea level. The average annual rainfall of 836 mm while the average temperature is 21^0 C. Golanjor rural municipality, Sunkoshi RM and Kamalamai municipality were taken for the study.

The district was selected purposively due to the higher potentiality for the sweet orange production. Furthermore, sweet orange farmers were selected randomly from the sampling frame. The total of 150 sweet orange producers were selected by using the formula given by Yamene (1967) for the calculation of sample size.

$$n = \frac{N}{1 + Ne^2}$$

N is the population size (sampling frame), n is the sample size, and e is the level of precision, which is 10%.

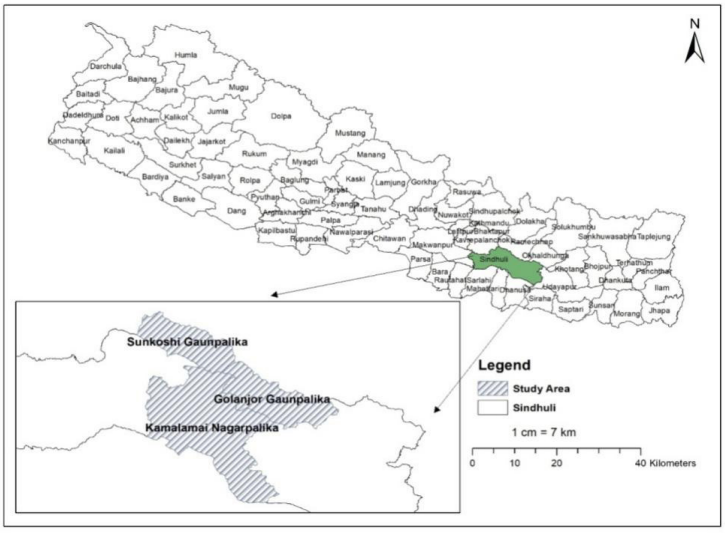

Figure 1: Map of study area

Data collection and analysis

Data were collected from primary and secondary sources during 2021 for the study. Household surveys, focus group discussions, key informant interviews and field observations employing semi-structured questionnaires were all considered primary sources. Secondary data from the annual agricultural statistical books, government and nongovernmental organization publications, and other sources available within the agricultural offices of the study areas were used. MS Excel 2013 and STATA were used to code, enter, and analyze the survey data.

Mathematical operations used during the study

For the calculation of market concentration, Herfindahl- Hirschman index (HHI), which is given by

$$HHI = \sum_{i=1}^{n} s_i^2$$

Where, HHI = Herfindahl- Hirschman index, n = number of firms (1 to n) and s = percentage of market shares. Higher the value of HHI, higher is the competitiveness of the firms. Sharma *et al.* (2021) have used the HHI for the estimation of firms' concentration. The value ranges from 0 to 10,000. Zero for perfect competition and 10,000 for monopoly type of market.

Marketing efficiency can be calculated by using Shepherd's formula. Safi *et al.* (2018) have used the Shepherd's formula to calculate the marketing efficiency based on the consumer price and total marketing cost

$$\text{Sherpherds}'\text{marketing efficiency} = \frac{\text{Consumer price}}{\text{TMC}} - 1$$

$$\text{TGMM (Rs)} = \frac{\text{Final consumers}'\text{price (Rs)} - \text{farm gate price(Rs)}}{\text{Final consumer price (Rs)}} \times 100$$

Where, TGMM is the Total Gross Market Margin

Producer's share is the price received by the farmer expressed as a percentage of the retail price that is price paid by the consumer

$$\text{Producer share} = \frac{\text{Farm gate price } (P_f)\ (Rs)}{\text{Retailer price } (P_r)(Rs)} \times 100$$

Benefit-cost ratio is the ratio of the value of sweet oranges including for by-product and the total cost of production on a per hectare basis.

$$\text{Benefit cost ratio} = \frac{\text{Total revenue collected (Rs)}}{\text{Total cost incurred (Rs)}}$$

Value addition percentage can be calculated with taking the reference of the formula used by Miah (2013) in his study.

$$\text{Value addition percentage} = \frac{\text{market margin}}{\text{purchase price}}$$

RESULTS AND DISCUSSION

Value chain mapping

The findings revealed that sweet orange produced in Sindhuli reached to the final consumers via two different channels. The first channel transacted 17% of the sweet orange from producers to the distant market which were Mahottari, Sarlahi, Chitwan and Kathmandu. The chain comprised of: Producers- Collectors (pre-harvest contractors)- Distant market consumers. The second channel covered 83% transacted the sweet orange from producers to the consumers and it was found to be organized as Producers-local Traders-Wholesalers-Retailers- consumers as shown in figure 3.

In the study of Parajulee *et al*. (2021), the marketing channel of sweet orange in Sindhuli district was found to be dominated by the wholesalers i.e. 45% of the farmers sold to the wholesalers, followed by 31% sold their products to the local traders, 24% farmers sold their products to the consumers directly from farm gate.

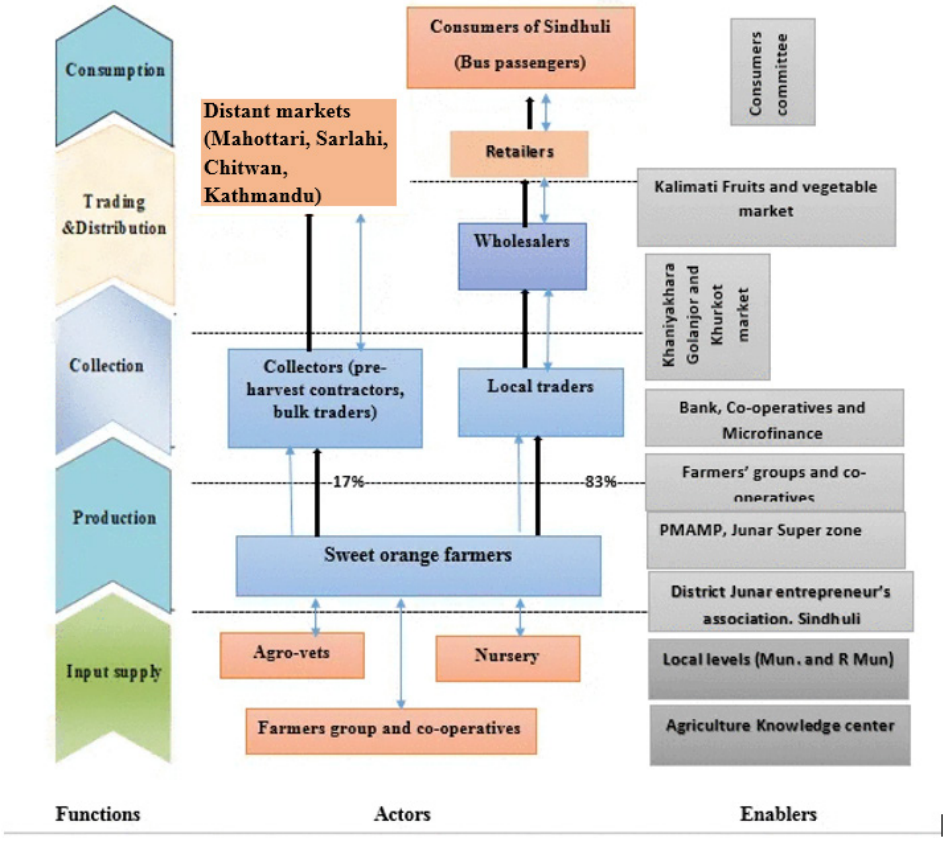

Figure 1: Value chain map of sweet orange in Sindhuli district

Value Chain Structure

The structure components or aspects of the sweet orange value chain includes the market demand and supply, infrastructure, governance, factor condition and market structure. In discussing the factor conditions, the land was prepared by using the tractors and bullocks by the producers in the Sindhuli district. As per the finding, 48.7 percent of

the producers in the study area reported that they hire the labour for the farm operation like: orchard establishment, management of orchard, harvesting of fruits and post-harvest handling of the products Sweet orange producers in the study area were found the increased use of the farmyard manure. Almost all farmers used the grafted saplings available from the local nurseries. Total of 56.7 percent of the farmers were found to have access to extension services. In the study area, 30.67 percent of the producers were found irrigating the sweet orange farmland. Pipelines and water tank storage were widely common practice of irrigation among the sweet orange producers in Sindhuli district (Table 1)

A total of 2.7% of the producers were found using the mixture of micronutrients under the trade name *Agrolive*, 54.7% of the producers received the trainings related to the sweet orange production from PMAMP sweet orange super zone, co-operatives and other organization as in the study of Parajulee *et al.* (2021), 75% of the respondents received the trainings on sweet orange production and well known with the noble techniques of sweet orange production. Results revealed that, 99.3% of the farmers used the grafted saplings, 98% sweet orange root stock were of trifoliate origin. Almost all the producers i.e. 100% of the sampled producers used the packing materials like cartoons, crates etc. for harvesting and marketing the sweet orange.

Some of the associated problems among sweet orange producers include the knowledge intensity about the value addition, since, it is the perennial fruit crops and requires the long-term investment, timely unavailability of the capital was also found as the potential barrier for the sweet orange production.

As per the traders', almost all the traders considered seasonality was the key factor followed by quality of products were the factors responsible for the price of the product. The result revealed that 79.3% of farmers were interested in scaling up of the farm as sweet orange production is major source of income.

The demand of product is lower as compared to its supply in winter season which lowers the price of product. The quality of the product is the determining force for the price variation. The import of the product from neighboring district has severe impact on the sweet orange price. Lower demand of the product at the festival season, as the seasonal fruit is in unripe stage and pre-harvesters contract at fruit set stage is common in study area. Awasthi (2014) identify the major constraints of horticultural market structure in Nepal is lack of mutual linkages and organization among farmers and traders, hindering equitable market sharing and agribusiness development.

Upon the findings of Herfindahl- Hirshmann index, strong oligopoly market of sweet orange was seen with highly concentrated market structure. In the findings of Sharma *et al.* (2021), the competitive value chain analysis of banana at Hetauda- Dumkibas road corridor, banana market was found monopolistically competitive. The governance structure of sweet orange production in the study area was characterized by the weak co-ordination among the value chain actors of the sweet orange (Table 1)

Among the surveyed ones, 10.67% farmers were taking the credit for the inputs purchase, orchard establishment, making the on-farm investment for the sweet orange production. Credits were available from local savings and credit co-operatives with 14.75% of the interest rate. There is also the provision of taking the credits from the banks like *Rastriya Banijya Bank* (RBB) and Agriculture development bank (ADB/N). Majority of producers in the study area were not insuring their enterprises. The major reason behind not insuring the sweet orange business were administrative drudgery and tedious job along

with the lack of knowledge regarding the benefits behind the insurance. The result revealed that 56.7% sampled farmers in the study areas were accessed to the extension services and 54.7% farmers received the training related to the sweet orange production from different institutions like: sweet orange super zone Sindhuli, National Center for Fruit Development (NCFD), Kritipur etc.

Table 1. Value Chain structure of sweet orange in Sindhuli district, Nepal

Variables	Indicator	Value
Factor conditions	Hired labour	48.7%
	Saplings	99.3% use grafted saplings with trifoliate root stock
	Access to irrigation	30.67 % (mainly pipeline and water tank)
	Manure	FYM (1083 *doko*/ha)
Adoption of new technology	Use of Micronutrients *(Agrolive)*	2.7%
	Tissue culture Practices	Testing phase at NARC
	Packaging materials	Cent percent use the cartoons
Supply behavior	Supply	winter season (November-January) 92.25% and Spring season (Feb.-may) 7.75%
Market structure	Herfindahl-Hirschmann index	9125
Institutional framework	Subsidies	Subsidies on input like mini tiller, protein baits
	Projects, associations	PMAMP, District sweet orange entrepreneurs associations, AKC and banks

Value Chain Conduct

The description of conduct is presented in Table 2. It includes the Product/market, pricing and promotion of product, production technologies analyze the conduct of value chain. Pre- harvest contracts from the collectors. The market condition of Sindhuli are favourable as evidenced by market condition for the supply of the raw as well as processed product of sweet orange. Kalimati fruit and vegetable market, Bardibas market of Mahottari, Chitwan and Nawalpur market of Sarlahi were the distant market of the sweet orange and Khaniyakharka, Khurkot were found as the major retail market of sweet orange. The major distant markets were in the range between 25 to 160 KM. Bardibas market is nearest and Chitwan market, farthest market to be transported. Total of 17% of the product was traded with the collectors (Pre-harvest contractors) and remaining 83% of the sweet orange transacted through the local traders. Small producers sold the sweet orange direct to the wholesalers and consumers with the varying prices in the local markets. Ten percent of the harvested products transacted from producers to consumers directly. Similarly, 40 % of the total product was found sold to the wholesalers and 50 % to the retailers. All traders negotiate with the producers and their cooperatives based on the demand- supply dynamics, technology used for the production, harvesting and post-harvest handling of the product. It was found that single sweet orange fruit's price ranged from NRs 6 to 8 depending upon the demand and supply of products for

traders. Day to day price get fluctuated for the product in the study area. Consumers were paying NRs 70 per Kg when directly purchased from producers and paying NRs 90 per Kg when purchase from retailers and wholesalers purchased at NRs 65 per Kg from producers. Findings of the ADB (2019) showed that the price setting mechanism is not transparent leading to the major problems for farmers.

Less than 10% of the sweet orange were processed in current year for the purpose of making sweet orange squash, sweet orange wine at micro level. More than 90% of the product was sold for the raw or table consumption. Thus, there is the great opportunity to conduct the business of differentiated products of sweet orange in the study area with strengthening the promotional strategies.

There was the good horizontal linkages and weak vertical linkage among the various actors and functions value chain of sweet orange. The product was traded mostly in an unprocessed form there was no long term business relationship between producers and traders. Producers had weak co-ordination with the chain actors which should be improved in coming days.

Table 2. Value Chain conduct of sweet orange in Sindhuli district, Nepal

Variables	Indicators	Value
Product and market system	Selling unit	Fruits
	Seller-buyer relationship	Contract system mostly informal between producers and traders
	Transportation means	Mini truck (Support by VCDP)
Price setting strategy	Demand-supply dynamics	Negotiation with the producers
Product differentiation and promotion	Raw products	More than 90%
	Processed product	Micro level (sweet orange squash, sweet orange wine)

Value chain performance

In this section, the performance of value chain evaluated by the calculation of marketing costs, marketing margins, value addition percentage, profit margins, and marketing efficiency of the sweet orange is summarized in table 3. Under performance, the share of the producers' on the retail price, farm gate price, gross marketing margin, consumer's price are studied (Gebremedhn *et al.,* 2019; Tarekegn *et al.,* 2020). The results revealed that the total production per hectare was 8644.46 Kg per hectare gross income received from sweet orange was NRs. 481724.74 at the study area. The total cost of production incurred in the sweet orange was found to be NRs. 349902.44 per hectare and for the production of per kg sweet orange the cost incurred was found to be NRs. 45.86 in Sindhuli.

Moreover, the gross profit per hectare for the sweet orange was NRs. 131822.31 in the study area. The benefit cost ratio (BCR) was 1.37 for sweet orange producers in the study area. In the study of Parajulee *et al.* (2021), found the benefit-cost ratio of sweet orange producers in Sindhuli district to be 2.81. The average price for the sweet orange at the producer's level was found to be NRs. 54.27. Findings suggested that the gross market

margin (GMM) ranged from 10.15 % to16.67 %. The net market margin (NMM) ranged from 1.44% to 10.93% was highest, followed by producers. The percentage of value added ranged from 15.38% to 20%. The total gross market margin was found to be 38.88 percent while the shepherd's market efficiency was found to be 3.81. Likewise, the channel has 61.11 percent of producers' share in consumer price, which indicates the efficient marketing channel.

Table 3. Value Chain performance of sweet orange in Sindhuli district, Nepal

Categories	Indicators	Value
Profitability	Benefit-cost ratio	1.37
Productivity	Gross income per ha (NRs)	481724.74
	Farm gate price (NRs)	54.27
	Gross production (Kg/ha)	8644.46
Marketing cost	Total marketing cost per fruit (NRs)	0.62 to 1.23
Marketing margin	GMM (%)	10.15 to 16.67
	NMM (%)	1.44 to 10.93
Marketing efficiency	TGMM (%)	38.88
	Producer share (%)	61.11
	Shepherd index	3.81
Value added	At producer level (%)	19.93
	At intermediate level (%)	18.18 to 20

CONCLUSION

The paper applied the approach to analyze the sweet orange value chain in Sindhuli. The product was found to reach the market via two channels with the involvement of pre-harvest collectors/ contractors and involvement of local traders. The structure indicators like cent percent farmers were found using the saplings (trifoliate rootstock), irrigation was found as the major entry barrier followed by the adoption of crop insurance inside the district. The conduct indicators like involvement of the various institutions for the extension, training, credit facilities, use of demand –supply dynamics for the price setting was seen in Sindhuli district. Performance of farmers was better in sindhuli district with BCR greater than 1, better value addition percentage at producer as well as intermediaries' level and producer's share on the consumer's price was also found better. By the evaluation of performances, enhancement of quality input supply and institutional set up for R&D, training, extension, credit and insurance services are key areas of intervention to enhance farm level competitiveness. Adoption of value addition and the collective as well as co-operatives based marketing, utilization of the mass media for the market information, subsidies and support schemes to the producers will be the motivating factor for the producers can be the major factors scheme to value addition process, which in turn could strengthen performance of the sweet orange value chain streams in Sindhuli.

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