

## Value Chain Analysis of Fruit and Vegetable Sub-sector to Enhance their Competitiveness along the Corridor of Ratna Highway

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### Abstract

Fruit and vegetable are highly remunerative sub-sectors that contribute about 15% of the total Agricultural Gross Product (GDP) in Nepal. This study was carried out in the selected firms, groups and cooperatives of four municipalities; Nepalgunj and Kohalpur of Banke, Birendranagar and Bheriganga of Surkhet district along the Ratna Highway (Nepalgunj to Surkhet) by using different tools and techniques; questionnaires, focus group discussion, Porter's Diamond, interaction, observation and key informant interview. The corridor has producing more than 50 vegetable crops and more than 20 fruit crops. Mango, banana, jackfruits, guava and litchi are the top five fruit crops cover 87.60% of the total fruit production in the corridor. Mango occupies first position (59.45%) in the total fruit production of the corridor followed by banana (15.38%). Likewise, the top five vegetable crops grown in this corridor are cabbage, tomato, cauliflower, onion and bitter gourd which contribute 53.05% of the total production. Among the vegetable crops, cabbage ranks the first position in the total vegetable production in the corridor which contributes 14.22% followed by tomato (13.52%) and cauliflower (11.66%). Market is major driven factor for the production of fruits and vegetables. From the study, producers supply their products direct local market (20%), agent traders (30%), collection centers (30%) and wholesale market (20%). In fresh vegetable case, about 70% fresh vegetables come from local growers and rest of 30% is come from India. However, about 98% of potato and onion are imported from India. Chinese market is seen dominant in garlic production and about 90% garlic are come from China via Kathmandu. In case of fruits, about 50% fruits come from India and rest of 25% come from China and of 25% of fruits come from local producers. In total fruit market, banana occupies first position (50%), followed by apple (20%), mandarin (15%), mango (10%) and other fruits (5%). In apple case, about 90% apples come from China, 8% come from Jumla and 2% from other places. In banana case, about 25% of Nepal and 75% of India, mandarin 40% of Nepal and 60% of India, mango-50% of Nepal and 50% of India. Grapes, pomegranate, pineapple, papaya, guava, etc. come from India (100%).

**Keywords:** Value chain, fruits and vegetables, actors, competitive advantages

### Introduction

Agriculture sector is a backbone of national economy, employment and food security in Nepal. This sector contributes 26.2 percent of the national Gross Domestic Product (GDP) and more than 60 percent of national employment (CBS, 2021). Although the contribution of the agricultural sector to the GDP has been steadily declining over the years, it can be considered significant from the point of view of structural change of the economy (MoF, 2021). In Nepal, more than 80 percent of the rural people are engaged in agriculture for their livelihoods and income. The average annual growth rate of agriculture in the last decade was 3.2% and production of agriculture sector has increased by 5.1% in fiscal year 2018/19.

Fruit and vegetable are the prime sub-sectors contribute 15% of the total Agricultural Gross Product (GDP) in Nepal (MoALD, 2021). Fruits and vegetables are major source of income of rural people for their livelihoods. Most of the small-holder farmers preferred fruits and vegetables due to instant income generating motive and having the quick return. This sub sector is a highly preferred by the marginalized, poor and disadvantaged farmers and farmers' groups. Fruits and vegetables stand as a most remunerative sub sector because it has well known comparative advantages than other sub sectors to enhance local economy.

The cultivation of fruit and vegetable crops in the country has shown a major sphere of the agriculture. Traditionally, fruits and vegetables are grown in a small scale around the homestead but now, it is becoming a prime sub sector for all farmers. Government has given emphasize for the promotion and expansion of fruits and vegetables in its policies and program. As a result, the areas and production of this sub sector is seen increasing in trends. Currently, there are more than 500 commodity specific cooperatives (Vegetable and Fruit – 202, Tea-109, Coffee-146, Junar-44) and their Federations; 8,069 Agriculture Cooperatives including fruit and vegetables crop and more than 25,000 producers' groups organised in various commodity groups including fruits, tea, coffee, vegetables, spices and vegetable seeds (Pradhan, et al. 2016).

The total production of the vegetable in the country in 2019/20 is 3,963, 383 tons from 281,132 hectares of land with the productivity of 14.09 t/ha. Likewise, the area, production and productivity of fruits in the country in 2019/20 are 119,025 ha, 1,249,764 tons and 10.50 t/ha respectively (MoALD, 2021). However, the productivity of fruits and vegetable sector is not accelerated over the time due to various causes. Some of the handicaps lowering its productivity are lack of available quality input materials, lack of irrigation, lack of skilled human resources, inadequate market facility, lack of innovative technologies and heavy post-harvest losses. The fruits and vegetables crops like mango, banana, papaya, litchi, guava, pineapple, tomato, potato, radish, brinjal, okra, chilli, cauliflower, cabbage, cucurbits, taro, coconut and arecanut are grown successfully in the terai and mid-hills. Altitude from 600 to 1800 masl are suitable for growing citrus, pear, peach, plum, persimmon, tomato, potato, beans, sweet pepper, carrot, cabbage, cauliflower, radish, turnip, leafy vegetables, coffee and tea. Similarly, apples, walnut, almond, carrot, cauliflower, cabbage, beans and potato are main horticultural crops of the high hills of Nepal (Bhattarai, 2020).

The cultivation of the fruits and vegetables are spread all over the country and maximum in plain areas due to market facility and consumers' demand. Among all province, Lumbini and Karnali province are rich in production and marketing these fruits and vegetables. Surkhet, Chindhhu, Kohalpur and Nepalgunj under the Ratna highway are main growing hubs of fruits and vegetable production. Many farmers and members of cooperatives are involved in growing many fruits and vegetables. Some of the major fruits and vegetables growing in this corridor are mango, banana, guava, litchi, pineapple, jackfruits, tomato, potato, chilli and capsicum, cauliflower, cabbage, broccoli, okra, eggplant, leafy vegetables, etc. Fruits and vegetables are the major value chains of the farmers in this corridor. However, the production and productivity of the fruits and vegetable are not seen satisfactory due to not adopting innovative technologies so far. The local technologies adopted by the farmers are not so efficient and effective to bust-up the production of fruit and vegetable crops. In addition, inadequate irrigation facility, lack of input materials, limited access of market facilities and difficult loan lending process from the banks and MFIs are the main lacuna for the promotion of this sub sector.

Nevertheless, the Government has given priority on fruit vegetable sub-sector; there is no accelerating effect on the development of this sub sector. The Karnali province has formulated the organic farming policy to promote organic fruits and vegetables. Likewise, federal Government has emphasized on organic fruits and vegetable products by formulating policies and guidelines. However, there is no mass production of organic manure and fertilizer in the country. Growers are producing only small-scale compost and vermi-compost own their lands which are not fully possible ways to trigger the organic model in the country.

Value chain is range of activities to bring a products or services through different phases from conception to consumption. Value chain can be defined as 'the sequence of related business activities from the provision of specific inputs for a particular product or product range to primary production, transformation and marketing, up to the final sale of the particular product to the consumer' (GIZ, 2018). All the activities pass through three main phases; input supply, production and output marketing.

The identification of gaps on supply, production and demand chain of fruit and vegetable sub sector is becoming major concern for the overall development of this sector. Exploring the innovative interventions to enhance the competitiveness of this sub sector by addressing existing gap is urgent. Hence, this study on fruit and vegetable value chain was conducted to identify the gaps and possible measures to remedy those gaps to enhance the competitiveness.

## Materials and Methods

The study was conducted in the selected firms, groups and cooperatives of Ratna Highway from Nepalgunj to Surkhet. This study was carried out in four municipalities under two clusters: Nepalgunj-Kohalpur and Surkhet-Chhinchu from 150 to 1500 masl (tropical to sub-tropical climate). Convenient or purposive sampling method was adopted during the study period. Structured and semi-structured questionnaires were administered to collect the information from the representative portion of producers, input suppliers and traders. The Porter's Diamond (Five Forces Model) tool was used to analyse the competitiveness and threats of the sub sector. Besides, various research methodologies (both qualitative and quantitative) such as observations, interactions, key informant interview (actors of the VC), site visits, questionnaires/ surveys were used as required for the collection of information from all the actors-producers, processors, traders, enablers involved in this value chain were followed. Desk review and field studies were conducted based on the nature, scope, timeframe and allocated resource to accomplish the task. Primary and secondary sources of data were used to come into the assigned task. Based on the thorough understanding of the TOR provided, the study was followed based on the understanding between two parties. Different books, journals and magazines were collected and reviewed related to gaps and value analysis of fruits and vegetable.

Data and information were collected from different offices i.e. Ministry of Agriculture and Livestock Development (MoALD), Ministry of Land Management, Agriculture and Cooperative (MoLMAC), Ministry of Finance (MoF), National Planning Commission (NPC), Central Bureau of Statistics (CBS), Trade Promotion centre, Federation of Nepalese Chamber of Commerce and Industry (FNCCI) and relevant municipalities. Farmers, firms and cooperatives of were visited and interacted. Participatory Analysis of Comparative Advantage (PACA) tool was used to analyse the competitiveness of the firms and cooperatives. Altogether, 14 farmers/firms/cooperatives including SPSF beneficiaries were selected from each cluster and interviewed. Likewise, eight agrovets and eight traders from each cluster were randomly selected and interviewed. Another interview was conducted with municipalities; Agriculture Knowledge Centre (AKS), District Cooperative Unions and DCCI/CCI were interviewed. The data were tabulated and presentation in tables, graphs and charts. Analysis and interpretation were done according to finding from the field information.

## Results and Discussion

### *Competitive advantage of fruits and vegetable sub sector in the corridor*

Fruit and vegetable crops are major sources of income for corridor people and have made agribusiness hub along the Ratna highway. This corridor starts from Rupadiya and touches to the main market points-Nepalgunj, Kohalpur, Chhinchu and Surkhet. The 113.08 km highway starts at Nepalgunj, where it depicts a continuation of National Highway of India and runs towards the North, where it crosses Mahendra Highway at Kohalpur. In addition, it is a gateway to the Indian boarder that connects the economic transaction between two countries; India and Nepal. The semi-urban area of Nepalgunj sub-metropolitan city, Kohalpur, Bheriganga and Birendranagar municipalities are the major fruit and vegetable pocket areas for the people of this corridor as well as other parts of the countries. The following points explicitly describe the strength of the corridor in fruits and vegetable sub-sector.

- The corridor is rich in natural resources such as land, water, forest and mines,
- The lands along the highway is very fertile and suitable for the production of various fruits and vegetables,
- It covers major market places such as Nepalgunj, Kohalpur, Chhinchu and Surkhet which are the driven factors for fruits and vegetables.
- It touches the Indian border, Rupadiya which is main junction of Nepalese product export and export.
- This corridor includes the major producing pockets such peri-urban area of Nepalgunj and Kohalpur municipalities, Harre, Chhinchu, Maintada, Ramghat and Lekparajul of Chhinchu municipality and peri-urban of Surkhet, Ratanagla, Ranimatta and Guranse of Surkhet municipality.
- Ranitalau, Kohalpur, Surkhet are the major agri-produce market centres that are the main pull factor for the production of fruits and vegetables.
- Many supporting organizations such as municipalities, agriculture knowledge centre, District Chamber of Commerce and Industry (DCCIs), Chamber of Commerce and Industry (CCIs), Prime-minister Agriculture Modernization Project (PMAMP), Nepal Agriculture Research Council (NARC), Agriculture colleges,

Agriculture Directorates, Ministry of land Management, Agriculture and Cooperative (MoLMAC), DCCU, DACU, Agriculture Produce Market Centres, etc. are working.

- More than 50 vegetable crops and more than 20 fruit crops are growing. Out of these, potato, tomato, eggplants, chilli and capsicum, Cole crops, cucurbits, okra, radish, carrot, broadleaf mustard under the vegetable crops and mango, banana, papaya, guava, bel, litchi, Indian gooseberry, jackfruits, pineapple, mandarin, sweet orange, lime, etc. under the fruit crops are grown.

#### *Area and production of fruits and vegetables in the corridor*

Ratna highway covers one sub-metropolitan city and three municipalities namely Nepalgunj sub-metropolitan city, Kohalpur, Birebdranagar and Bheriganga municipalities. These are located along the Ratna highway from boarder of India to Surkhet district. The areas of these municipalities are fall under the tropical to sub-tropical climatic regime and also fertile for the cultivation of many crops including fruits and vegetables. According to record of municipalities in 2021, the total fruit area, production and productivity of fruit is 2075.57 ha, 10,180.53 tons and 4.9 t/ha respectively. Likewise, the area, production, productivity of vegetable is 9493 ha, 75,576.80 tons and 7.96 t/ha respectively. These figures indicated that there is a big potentiality in promotion of such types of fruits and vegetables in these areas.

**Table 1.** Area and production of fruit and vegetable crops in Nepalgunj-Surkhet road corridor

Municipality	Fruit			Vegetable		
	Area (ha)	Production (tons)	Yield (t/ha)	Area (ha)	Production (tons)	Yield (t/ha)
Nepalgunj	5.14	52.38	10.19	36.50	485.30	13.30
Kohalpur	7.43	64.15	8.63	700.00	9100.00	13.00
Birebdranagar	2018.00	9704.00	4.81	7956.50	59591.5	7.49
Bheriganga	45.00	360.00	8.00	800.00	6400.00	8.00
Total	2075.57	10180.53	4.90	9493.00	75576.80	7.96

Source: Municipalities, 2021

#### *Priority fruits and vegetable products in the corridor*

Climate, soil, climate, physiographic condition, socio-cultural situations, market demand and Government policies are the main determinants for the prioritization of any products. Among them, market is the main pull factor which determines the scale of production. As of production statistics by MoALD, 2021, mango, banana, jackfruits, guava and litchi under the fruit crops and cabbage, tomato, cauliflower, onion and bitter gourd under the vegetable crops have recorded top five crops in this corridor.

**Table 2.** Top five fruit and vegetable crops of Ratna Corridors (Banke & Surkhet districts)

SN	Crop	Area (ha)	Production (tons)	Productivity (t/ha)	Production share (%)
<b>Fruit crops</b>					
1	Mango	1,469	12,702	8.65	59.45
2	Banana	278	3,286	11.82	15.38
3	Jackfruits	92	962	10.51	4.50
4	Guava	117	961	8.21	4.50
5	Litchi	87	805	9.26	3.77
Total of five crops		2,043	18,716	9.16	87.60
Rest of the crops		389	2,649	6.82	12.40
<b>Corridor</b>		<b>2431.20</b>	<b>21365.24</b>	<b>8.79</b>	<b>100.00</b>
<b>Vegetable crops</b>					
1	Cabbage	1,133	18,858	16.65	14.22
2	Tomato	738	17,927	24.29	13.52
3	Cauliflower	913	15,456	16.92	11.66
4	Onion	624	9,770	15.66	7.37
5	Bitter gourd	422	8,302	19.67	6.26

SN	Crop	Area (ha)	Production (tons)	Productivity (t/ha)	Production share (%)
	Total of five crops	3,830	70,312	19.67	53.03
	Rest of the crops	6,113	62,278	19.67	46.97
	<b>Corridor</b>	<b>9943.26</b>	<b>132590.50</b>	<b>27.40</b>	<b>100.00</b>

Source: MoALD, 2021

Mango, banana, jackfruits, guava and litchi are the top five fruit crops cover 87.60% of the total fruit production in the corridor. Among them, mango falls in first position in the total fruit production of the corridor and has secured 59.45% in the production share followed by banana (15.38%). Likewise, the top five vegetable crops grown in this corridor are cabbage, tomato, cauliflower, onion and bitter gourd which contribute 53.05% of the total production. Among the vegetable crops, cabbage ranks the first position in the total vegetable production in the corridor which contributes 14.22% followed by tomato (13.52%) and cauliflower (11.66%).

### Commonly grown fruits and vegetables

Due to the climatic variation, the growing of vegetable and fruits is slightly different from Nepalgunj-Kohalpur cluster to Surkhet-Chhinchu cluster. In normal season the cultivation practice of cucurbits is 2-3 months earlier than in Nepalgunj-Kohalpur cluster. Some progressive farmers cultivate the cucurbits and Cole crops in both seasons i.e. summer and winter season. Potato, tomato, bottle gourd, chili and cauliflower are the most desirable crops in Nepalgunj-Kohalpur cluster due to their ease of marketing, high yielding, ease of cultivation and lower in cost of production.

**Table 3.** Commonly grown fruits and vegetable in the corridor

Crop	Cluster I- Nepalgunj and Kohalpur	Cluster II-Surkhet and Chhinchu
Vegetables	Winter to summer-Pumpkins, squash, zucchini, cucumber, bottle gourd, bitter gourd, sponge gourd, pointed gourd, snake gourd, okra, eggplant, spinach, cowpea, etc. Winter-Zucchini, bitter gourd, bottle gourd, pumpkin, watermelon, Potato, pea, cauliflower, cabbage, broccoli, carrot, radish, turnip, tomato, beans, onion, garlic, etc.	Winter to summer-Pumpkins, squash, zucchini, cucumber, bottle gourd, bitter gourd, sponge gourd, pointed gourd, snake gourd, spinach, cowpea, beans, tomato, chilli and capsicum, tomato, etc. Winter- Potato, cauliflower, cabbage, broccoli, spinach, broadleaf mustard, beans, etc.
Fruits	Mango, banana, guava, litchi, pineapple, Amla, papaya, lime, etc.	Lime, mango (Ramghat area)

The cropping index of vegetable is more than in cereals. Generally, three crops are taken from same piece of lands annually. Cropping index is related to cropping pattern.

### Fruit and vegetable production pockets in the corridors

There several fertile and feasible locations along the road corridor. These places are the prime resources for the cultivation of fruit and vegetable crops. Climates and altitude are varied according to places located. There are many potential pocket areas situated in each municipality along the road corridor.

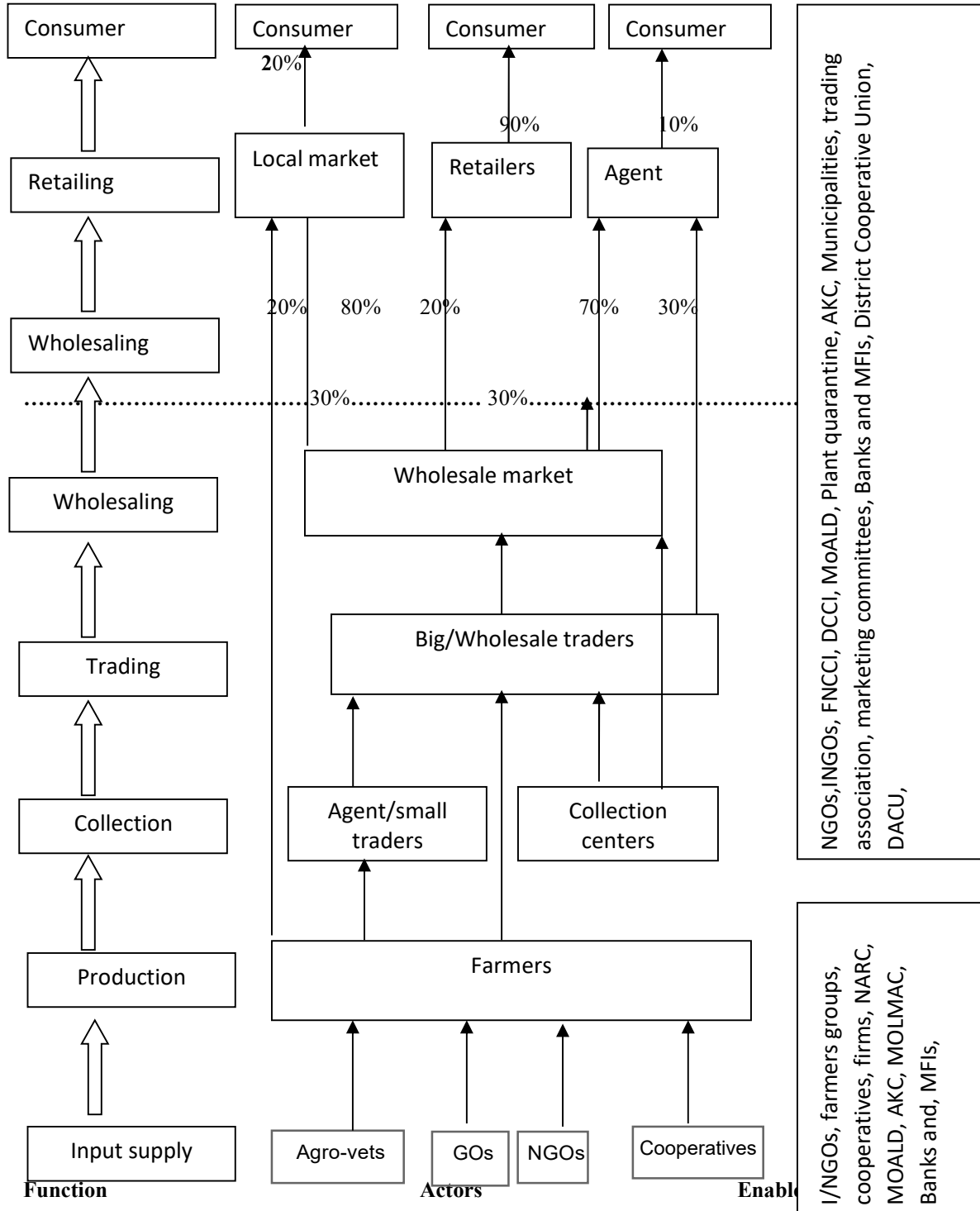
**Table 4.** Production pocket area of vegetable in the corridor

Municipalities	Crops	Production pocket area
Nepalgunj	Vegetable	Duduwa, Jaispur, Kataliya, Bhuregaun, Manikapur, etc.
	Fruit	Duduwa, Jaispur, Kataliya, Bhuregaun, Manikapur, etc.
Kohalpur	Vegetable	Pipari, Bharaiya, Kharkatar, Semari, Rajhena, Chaudhariya, Rajgadhuwa, Lakhna, Jharkatti, Ganapur, Guwa, Bhanuwa, etc
	Fruit	Rajhena, Pipari, Semari, Kharkatar, Bharaiya, etc.
Surkhet	Vegetable	Alayachaur,, Lehada, Kubairakhe, Nigalpani, Kanchhi bazaar, Himchulla, Koldanda, Dhauri, Panchapuri, Cahir, etc.
	Fruit	Nalkhol (lime), Melpani (acid fruit, banana), Himchulla (walnut, Lehada (lime, alainchi, kiwi), etc.
Chhinchu	Vegetable	Thamichaur, Muralikhola, Hattosure, Chhinchu, Sandikhola, Kicha, Jahare,, etc.
	Fruit	Ramghat (mango), maintada (mango)

**Cropping index, cropping pattern and cropping technologies**

The trend of numbers of crops grown is increased. Before ten years, they produced only one or hardly two crops; rice-wheat in irrigated land and maize-wheat in unirrigated areas. Recently, they produce three crops in a year in the same piece of land. Rice-vegetable-vegetable or Rice-mustard-vegetable or vegetable-vegetable-vegetable or maize-vegetable-vegetable or vegetable-wheat-vegetable is the main cropping pattern practiced by the growers of this corridor.

**Value chain map of fruits and vegetables**



**Figure 1.** Value chain map of vegetable sub-sector in Ratna Highway Corridor

In case of fruits and vegetable marketing, collector centers and agents/small traders/middlemen are involved. From the study, producers supply their products direct local market/haatbazaar (20%), agent traders (30%), collection centers (30%) and wholesale market (20%). Agent traders are called also roadside traders who are the main part of the trading of fruits and vegetables followed by concerned collection centres are major supplier for big traders. Big traders in turn sell their products to the wholesale markets (80%) and their assigned agent traders (20%). Then, wholesale market sent their product retailers (90%) and their marketing agent (10%). Finally, retailers and marketing agents sell their products to the consumers.

#### ***Characteristics of value chain actors***

Value Chain involves more than one actor, working together to satisfy the demands of a particular product.

#### **Producers**

**Strength:** All the firms and cooperatives are rich in seed fund; they can invest in their initial investment as seed money. Each cooperative has more than 200 members and more than 10 million annual transactions. All the members are active and have greater knowledge on cooperative running. They all focus in agriculture and agriculture-based enterprises. Their production pockets have suitable climate and access to road. They focus on organic production. Unity and cooperation in marketing is an asset. Organic firm is a model firm for organic products and has initiated numbers of organic vegetable in Surkhet. Most the firm/farmers' group/cooperative have long experience on farming, they aware about input materials and marketing trends, they have knowledge, skills and good attitude in farming, good linkage and coordination; ability to work in the field, having a fresh and organic production, they aware about quality seed, etc.

**Weakness:** Cooperatives have not skilled manpower and capacity to run the agriculture business in a large volume and coverage. Organic manure is not produced sufficiently. They lack on postharvest handling practices. Small scale of production, lack of irrigation, inadequate information of production technologies, infestation of insect pests and diseases are the major problems incurred in the area. Having small scale of technology limits the production and competitiveness of the firm and cooperatives. Inadequate information on quality seeds and input materials; limited knowledge on innovative technologies, they are not aware about cropping cycle; lack of organic application procedures (quantity and quality); inadequate organic manure, lack of business skill (how to determine the price of own products), lack of product diversification, lack of postharvest handling techniques, etc.

**Opportunities:** The presence of the supporting organizations; expanding market infrastructure, emphasizing by the federal and provincial Governments, changing food consumption habit, introducing innovative and efficient technologies are some basis of opportunities. Supported by various supporting organizations; market expanding, infrastructure developing, yield yielding varieties developing, increasing in food and nutrition awareness; innovative and efficient technologies introducing; Government has emphasized on organic products.

**Threats/Challenges:** Merging policy of cooperative, not having congenial environment to invest in the agriculture sub sector, damaging the crops by disasters and unavailability of skilled and experience human resources are key areas of challenges to the cooperatives and firms. Disease and insect pest infestation, natural disaster (hailstone, thunderstorm, landslide, soil erosion, fertility erosion, genetic erosion, earthquake, COVID-19, etc); price fluctuation, Indian products dominance, etc. are some threats facing by them.

**Input suppliers i.e. agrovets:** Agrovets are main suppliers of input materials to the production firms. As the findings, there are three types of agrovets; wholesalers, retailers and service providers. Wholesalers have large business, having more than ten million annual transactions and located at centre point of the city from where they supply the different agri-inputs to the farmers. Retailers are medium sized in business around 1-2 million annual transaction and have direct contact to the farmers/firms. The service providers are also treated as agrovets or running agrovets that means they provide service immediately with narrow command area, door to door service, embedded service and very close to the farmers/firms.

**Strength:** Majority of the agrovets are well established and registered. Most of the agrovet owners are from technical background and agricultural profession. They are trying to maintain the quality standards and business ethics in supply side. They are not selling expiry items. They are experienced in business of seed, pesticides, fertilizers and agri-equipments. They have maintained the trust among the buyers.

**Weakness:** However, sometimes wholesalers sell small quantity as retailers, sometime they are not maintaining the quality and combined selling of veterinary item with agricultural items are some drawbacks in this sector.

**Opportunities:** The area and production scale is increasing day by day in this corridor, Government has emphasized on fruits and vegetable production, supporting organization is exist, supplier (back parties) are supporting in business.

**Threats/Challenges:** Strikes, credits, pandemic diseases like COVID-19, Government policies are some example of challenges. Quality supply, innovative technologies, stock maintenance, satisfaction with growers are other challenges for this business. In case of policy, about 98% of seeds are come from India by illegal way because Agrovets are allowed to import only registered items which are only 2%. The 98% Indian seeds are highly demanded by the growers hence, agrovets bring these seeds illegal way from agents and sell to the growers. From this delay registering process of seeds made incontinent to the agrovets and losing the revenue.

**Traders:** Fruits and vegetable traders are the main value chain actors. There are about 129 registered traders related to fruit and vegetable sub-sector which are actively involved in the trading purpose along the road corridor. There are three types of traders; wholesalers, retailers and collectors or agents.

Road side traders or collectors are the primary part of the trading who link directly to the farmers for the marketing purpose. They might be residents of the production pocket and serve as service providers even if farmers need. Sometime they pay advance for the products to the farmers. Some wholesalers keep the agent to collect fruits and vegetables in a production site. Their trading activities include buying and assembling, repacking, sorting, selling to middlemen, Transporting and selling to wholesale markets. According to them, they received at least 10 percent margin profit from the wholesalers they contacted.

The traders who collect products in bulk amount from roads or collection centres are the big traders. About 10-15 big traders are located in each municipalities for fruits and vegetable marketing. They linked to the SPSF partners for fruits and vegetable collection. Big traders are also called wholesale traders. Wholesalers buy the products from those agents or road side traders or from collection centres or district markets and sell their products to the retailers spread over the district or surrounding areas. They are mainly located in *Mandis* where there are market hubs with some infrastructure such as office buildings, open stores, transaction sheds and shop sheds. These market hubs are usually established with government support and operated by local committee.

Retailer involvement in the chain includes buying of fruits and vegetables transport to retail shops, grading, displaying and selling to consumers. Their market share is 15 to 20 percent. Retailers are not organized into a formal organization; they all do their business individually.

**Strength:** Having long experience in trading, regular supply for demanded products; building trust between suppliers and buyers; high dealing and bargaining power; credit facility to the buyers, etc. They bring from the production site themselves and sell the products interior parts of the area, advance payment to the producers, etc.

**Weakness:** Having unskilled human resources in trading (not having specialization); not having credit control mechanism, some traders have not trading ethics, sometimes they are selling poor quality products, they are not interested to buy small volume of products, etc.

**Opportunities:** Open and expanding market, high demand, consumption awareness increased; paying capacity being high, Government support, etc.

**Threats/challenges:** Tax and tariff increasing at custom, long holding period at custom at boarder; strike, spreading epidemic diseases i.e. COVID-19, quality maintenance, etc.

**Table 5.** Registered agrovets, farmers groups, agri-cooperatives and fruit and vegetable traders in the corridor

Municipality	Agro-vets	Farmers groups	Farmers	Agri-cooperatives	Registered fruits & vegetable traders
Nepalgunj	29	18	360	45	66
Kohalpur	16	42	966	38	30
Birendranagar	11	120	2400	74	17
Bheriganga	8	65	1430	40	16
<b>Total</b>	<b>64</b>	<b>245</b>	<b>5156</b>	<b>197</b>	<b>129</b>

Source: AKC, AD, Market centre, Municipality, 2021



**Enablers:** The supporting organizations located in the concerned municipality are the main actors for the enabling the business environment for fruits and vegetable promotion. There are many enablers such as MoALD, MOLMAC, Municipalities, FNCCI, DCCI,

DCU, DACU, Traders association, marketing committee, etc. These organizations play the vital role to establish, revive and rejuvenate the actors with providing adequate support and suggestions.

**Strength:** The major strength of enablers is their established structure and working system. Municipalities are supporting to the SPSF partners in matching budgets, coordination and other enabling environment. They all have their own working policies and programs that emphasize to the SPSF partners.

**Weakness:** Inadequate service delivery, insufficient technical staffs and weak in updated information, limited budget for focused sub sectors are some weaknesses of the municipalities.

**Opportunities:** large numbers of producer's groups, working private sectors, helping hands i.e. I/NGOs, cooperatives and private sectors.

**Threats/challenges:** Information on innovative technologies, efficient and effective service delivery, how to cover the whole beneficiaries within limited human plus financial resources.

### *Market analysis*

Market is a major driven factor for the production of fruits and vegetables. There are three organized agriculture produce market centres such as Ranitalu Agri-Market Centre, Nepalgunj, Kohalpur Agri-Market Centre, Kohalpur, Surkhet Agri-Produce Market Centre, Surkhet. However, Chhinchu has not established such types of organized agri-produce market centre. In Chhinchu, only individual mixed fruit and vegetable shops are dispersed in and around the small city which are called *Mandi* in their language. Ranitalau is the biggest vegetable market in this corridor located at Ranitalau of Nepalgunj. Fresh vegetables, potato, onion, garlic are the main items coming here. In case of fresh vegetable, about 30% vegetable comes from India and remaining 40% is supplied from local people and 30% comes from Kapurkot, Salyan district. About 90% of potato and onion comes from India and remaining 2% comes from local areas. In case of garlic, Chinese market is seen dominant and about 90% of them are imported from China thru Kathmandu. About 50% fruits are imported from India and remaining 25% fruits are from China and 25% of Nepal. These vegetable and fruits are sold at local market (40%) and to district of Surkhet, Dang, Bardiya and Chitwan (60%). Kohalpur is another agri-produce market centre located at Dash Bigha of Kohalpur, Banke. In this market, fresh vegetable comes from local (20% and Rolpa, Salyan, Dang (80%). Potato and onion (98%) come from India and Garlic comes from China (90%) and local (10%). Fruits come from India (50%), China (25%) and Nepal (25%). And these fruits and vegetables are sold to local people (50%) and outside (50%).

Surkhet Agri-market Centre (formerly bulbule Agri-Produce Market Centre) is one of the biggest agri market centres of the Karnali province located at Birendranagar, Surkhet. According to record, about 8% vegetables come from local people, about 40% vegetable come from Dailekh, Jumla, Chitwan and other districts and 50% vegetables come from India. Chhinchu market is not well organized and only some fruits and vegetable traders selling their products separately by their own shop called *mandi* in their language. They all bring their fruits and vegetables from Surkhet (40%) and Kohalpur/Nepalgunj (40%) and India (20%) and sell to the local people (80%) and Jajarkot (20%). In overall, Indian products are overwhelmed in the market. About 60-70% of the Indian fruits and vegetables are imported in this corridor. In fresh vegetable case, local markets have shown satisfactory performance meaning about 70% fresh vegetables come from local growers and rest of 30% is come from India. However, about 98% of potato and onion are imported from India. Chinese market is seen dominant in garlic production and about 90% garlic come from China via Kathmandu. In case of fruits, about 50% fruits come from India and rest of 25% come from China, especially apple and rest of 25% of fruits come from local producers. In total fruit market, banana occupies first position (50%), followed by apple (20%), mandarin (15%), mango (10%) and other fruits (5%). In apple case, about 90% apple come from china and rest 8% come from Jumla and 2% from other places. In banana case, about 25% of Nepal and 75% of India, mandarin 40% of Nepal and 60% of India, mango-50% of Nepal and 50% of India, Other (grapes, pomegranate, pineapple, papaya, guava, etc.) 100% of India. The fruits are supplied to the growers to consumers is this route: Growers-Agent/direct-wholesaler-Wholesalers-Retailers-Consumers.

The major bottleneck in the fruit marketing is there is dominant of Indian products over the Nepalese market because of superiority in the quality and being large scale of production. In case of fruits, there is no big orchard and variety of fruits in our production area.

**Table 6.** Inlet and outlet status of fruits and vegetables of major market centres in road corridor (2077/78)

**A. Ranitalau market centre, Nepalgunj**

Products	Inlet volume (tons)	Inlet (source and percentage)	Outlet (places and percentage)	Annual transaction (NRs.)
Fresh vegetable	5,475.00	India-30%, Kapurkot-30%, Local-40%	Local-40%, Outside-60% (Surkhet, Dang, Surkhet, Narayanghat)	1,02,20,00,000
Potato	7,300.00	India-98%, Local-2%	Local-40%, Outside-60% (Surkhet, Dang, Surkhet, Narayanghat)	
Onion	3,650.00	India-98%, Local-2%	Local-40%, Outside-60% (Surkhet, Dang, Surkhet, Narayanghat)	
Garlic	182.50	China-90%, local-10%	Local-40%, Outside-60% (Surkhet, Dang, Surkhet, Narayanghat)	
Fruit	12,592.50	China-25%, Nepal-25%, India-50%	Local-25%, Surkhet, Bardiya, Dang, Kailali-75%	
<b>Total</b>	<b>29,200.00</b>	<b>Fresh vegetable-Nepal-70%, India-30% Potato &amp; onion-India-98%, Nepal-2%</b>	<b>Local-40%, Outside-60% (Surkhet, Dang, Bardiya, Chitwan)</b>	

**B. Kohalpur market centre, Kohalpur**

Fresh vegetable	5,488.00	Local-20%, Salyan, Rolpa and Dang-80%	Local-60%, Out of Kohalpur-40%	50,37,55,000
Potato	2,817.00	India-98%, Local-2%	Local-98%, Out of Kohalpur-2%	
Onion	433.00	India-98%, Local-2%	Local-98%, Out of Kohalpur-2%	
Garlic	180.00	China-98%, Local-10%	Local-100%	
Fruit	5,475.00	Nepal-25%, China-25%, India-50%	Local-30%, Out of Kohalpur-70%	
<b>Total</b>	<b>14,393.00</b>	<b>Nepal-40%, India-60%</b>	<b>Local-50%, out of Kohalpur-50%</b>	

**C. Surkhet market centre, Surkhet**

Vegetable	15,951.00	Local-8%, Dailekh, Jumla, Chitwan-29%, India-51%, other district-12%	Local-50%, out of Surkhet-50%	83,78,82,500
Fruit	7,346.70	Local-12.36%, Dailekh+Jumla+Chitwan-25.9%, India-39.15%, others-22.58%	Local-50%, out of Surkhet-50%	
Spices	641.80	Local-4.02%, Dailekh+Jumla+Chitwan-16.14%, India-65.61%, others-14.23%	Local-40%, out of Surkhet-60%	
<b>Total</b>	<b>23,939.50</b>	<b>Local-9%, Dailekh+ Jumla+ Chitwan-28%, India-48%, others-15%</b>	<b>Local-50%, out of Surkhet-50%</b>	

**D. Chhinchu market center (not organized), Chhinchu**

Vegetable	1,168.00	Surkhet mandi-40%, Kohalpur+ Nepalgunj-40%, India-20%	Local-80%, Jajarkot-20%	7,15,40,000
Fruit	584.00	Surkhet mandi-25%, Kohalpur mandi-25%, Tikapur+Jumla-25%, India-25%	Local-80%, Jajarkot-20%	
Spices	292.00	Surkhet mandi-40%, Kohalpur+ Nepalgunj-40%, India-20%	Local-80%, Jajarkot-20%	
<b>Total</b>	<b>2,044.00</b>	<b>Surkhet mandi-40%, Kohalpur+ Nepalgunj-40%, India-20%</b>	<b>Local-80%, Jajarkot-20%</b>	

Source: APMMCs, 2021 (figures are placed on recorded and estimated as per discussion with APMMCs)

***Competitiveness of Nepalese products vs. Indian products***

Indian products are being dominant over the Nepalese products from the time immemorial. In aggregate, about 70% of total products is come from India. Remaining 30% products are supplied by different parts of the country. In case of fresh vegetables, only 30% is come from India and remaining 70% is come from Nepal. But before, 5-7 years, the trend was opposite i.e. 70% fresh vegetable come from India and only 30% is supplied from different part of Nepal. Mainly two factors are responsible to influence Indian products; quantity and quality. The scale of production is high in India than Nepal and postharvest handling of products such as grading, labeling, are packaging are superior over Nepalese products. Being voluminous products, most of the Indian products are cheap and has maintained the international standard. Picking and packing techniques is superior that prolong the shelf life in longer storage period. Established marketing system and agro-enterprises are key factors that overwhelmed in trading business in Nepal. This is a challenging matter to overcome these pitfalls in fruits and vegetable sub-sector. Nepali vegetables are comparatively more expensive than Indian vegetables as Indian vegetables benefit from subsidies and also have the advantage of higher yield and better infrastructure, thereby reducing production costs. Furthermore, Indian traders provide credit of 6-12 months, which is a major pull factor for traders in Nepal (ADB, 2019). For vegetables, the general problem of lower productivity, due to limited access to quality inputs and information on their proper usage, exists among both “hanging-in” and subsistence farmers. In Nepal, 50% to 60% of vegetables consumed are imported from India to major market hubs and market centres (UKAID, 2020).

Nepali fruits and vegetables are fresh, organic and easily available to the local people. However, they are seasonable and not voluminous in production. The climate for fresh vegetables and fruit production is very favorable that can be utilized for the expansion of organic fruit and vegetable farming. On the other side, the government of Nepal has emphasized in the promotion of organic products like fruits and vegetables. Indian products contain heavy pesticide residues that hazard in human health.

***Major gaps and their market-based solution/measures***

Fruit and vegetable value chain is a prime sub sector of this corridor and contribute socio-economic and livelihood secure. Many activities fall under input supply, production and output marketing level are working and have supported in whole value chains. However, there are many gaps which are hindering the functionality of value chains. The major gaps in input supply level are quality, quantity and access of input materials. Likewise, in production level, the main gaps are quality maintenance i.e. postharvest handling (time, stage and methods of harvesting; curing and cleaning; sorting and grading, packing house operation, packaging and labeling; transportation and storage); limited scale of production; inadequate information of technology; insufficient irrigation and infrastructure. Major gaps in the marketing level are lack of formal agreement with big traders, lack of infrastructure for marketing i.e. market shed; limited information on organic products and their access to supply the nutritional requirement of the soil. These are some examples of gaps related to fruits and vegetable sub sector.

**Conclusion and Recommendation**

The fruit cultivation and commercialization is little bit behind in progress than that found in vegetable activities. However, there are many gaps hindering in the development of fruits and vegetable sub sector. Lack of information on input materials, limited access to input materials, lack of irrigation, lack of innovative technologies, lack of capacity to operate the new technologies, inadequate market information and infrastructures and insufficient knowledge on innovative technologies are some lacuna existing in this sub sector.

- Quality input assurance (indigenous, nutritious, high valued and high profitable seeds, innovative and efficient technologies, organic manure (compost, vermicompost, bio-fertilizers); bio-pesticides, IPM, IMPNS, skilled and experienced technical human resources, irrigation, innovative technologies, financial support and subsidies, research, etc.
- Commercialization/competitiveness: business plan, market development plan, value chain analysis; technology promotion, expansion of farming, etc.
- Technical promotion: Use of innovation on irrigation, crop protection, crop nutrition, bio-farming, agro-forestry system, etc.
- Crop insurance: Crop insurance for major and high value crops for crop loss recovery

- Postharvest improvement/handling: pack house, harvesting, sorting, grading, cleaning, pre-cooling, packaging, transportation, storage, etc.
- Financial support for smallholders (as grants): grants and subsidies for ultra-poor.
- Research and development (R&D): small research on organic manures, irrigation, soil fertility, plant nutrition, etc. can be done in farm as *insitu* research and on the basis of on-farm research, best practices are replicated.

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