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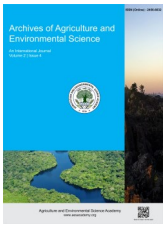

ORIGINAL RESEARCH ARTICLE

Competitiveness of banana value chain along Hetauda-Dumkibas road corridor, Nepal: An eclectic approach

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ABSTRACT

Government of Nepal has announced a super-zone of banana in Chitwan district and a block in Nawalparasi East district to enhance productivity and commercialization of banana subsector in the Hetauda-Dumkibas road corridor. This study is the first of its kind to analyze the competitive position of banana value chains in the corridor. Using the literature review approach, the paper generated a conceptual framework to assess competitiveness of value chain. A total of 160 producers, 22 traders, 3 wholesale commission agents and 10 agrovets were selected using stratified random sampling method. The pretested semi-structured questionnaires surveys, focused group discussions and key informant interviews were conducted to collect primary data and analyzed using STATA and MS Excel. The study revealed two value chain streams in the corridor- one in Chitwan district and another in Nawalparasi East district. Most of the structure indicators were found similar for both value chain streams. Banana market was monopolistically competitive along both chains. Producers of Chitwan district were more competitive than Nawalparasi East because of their higher benefit cost ratio and higher farm gate price for fingers. The reasons for this were relatively better institutional set up contributing to extension, insurance and training services, and better technological adoption rate in Chitwan district. In addition, the chain stream of Nawalparasi East had relatively lower marketing cost and higher market margin, market efficiency and value addition. The reasons for this were shorter chains and low level of transportation cost. Thus, policy efforts to strengthen local institutions providing extension, training, insurances, market information and credits are recommended to improve the performance of the value chain. In addition, encouraging processing and value addition of bananas should be of concern to development practitioners and policy makers.

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INTRODUCTION

Competitiveness refers to capability of a sector or nation to produce goods and services maintaining relatively higher factor productivity and superior quality than its domestic and international competitors (Maravilhas *et al.*, 2019; Latruffe, 2010). However, the underlying basis and purpose used to define competitiveness at national and sectoral level is viewed in many ways among academicians and researchers (Bhawsar and Chattopadhyay, 2015; Latruffe, 2010; Chikán, 2008). At a sectoral level, competitive advantage is gained, when performance activities like designing, production, marketing, delivering and supporting activities produce more cheaply and efficiently than that of its rivals (Latruffe, 2010). While for a nation, the objective is to deal successfully with competitive markets by making profits and increasing its market shares aiming to maintain and improve its citizens' living standards (Bhawsar and Chattopadhyay, 2015; Chikán, 2008). The range

of competitiveness specific to sectors and locations differs which are sometimes termed as, competitive advantage (sector specific) and comparative advantage (location-specific), respectively (Kogut, 1995). Widely applied methods and concepts in the literature to measure and analyze competitiveness include Porter's five forces framework (Porter, 2008), Porter's diamond model (Porter, 1990), value chain approach (Rich *et al.*, 2011), revealed comparative advantage (Abbas and Waheed, 2017), competitiveness index, domestic resources cost (Gorton and Davidova, 2001), export market shares and so on.

Among them, value chain approach (VCA) is a pragmatic and empirical tool to design the competitive strategies, understanding the source of competitive advantage and identifying the leverage points to create higher value (Ensign, 2001; Subramanian, 2007). VCA helps to identify the relationship and linkage of various activities, which is shown as a value chain map (Kaplinsky and Morris, 2001). Value chains sometimes standalone could study to provide inputs to government strategies (Subramanian, 2007). However, it should not be seen as "a panacea" for assessing the factors influencing performance and scope of subsector or firms, rather a window of opportunity to complement the policy framework of government in territorial context or specific socio-cultural pattern (Staritz, 2012; Altenburg, 2007). Many scholars prefer more comprehensive and stress to conceptualize the value chain as part of a broader set to understand competitiveness (Rutgers, 2010; Altenburg, 2007).

A meaningful instrument to conceptualize impacts of competitive strategies on performance and scope of firms based on existing socio-economic, environmental and institutional structure is Structure-Conduct-Performance (SCP) framework (Magin and Stark, 2015; Setiawan *et al.*, 2013; Ralston *et al.*, 2015). It was originally rested on industrial organizational theory to analyze market powers of industries and firms (Ferguson, 1988). Important contributions of Klint and Sjoberg (2003) and Figueiredo *et al.* (2014) have devised it in the context of local chain (or network level) of a territory. Using the literature surveys, the suitable categories of SCP were gathered and the paper attempted to apply the SCP framework to value chains of the banana subsector of Hetauda-Dumkibas road corridor. The banana subsector in the corridor has been contributing to the local economy of the peripheral region through income and employment generations. In addition, the government of Nepal has also adopted the pocket package strategy and initiated her programs through establishing a super zone and a block of banana production in the corridor. However, previous studies showed that the corridor has various production and market level constraints like disease and pest infestations, inequitable market sharing, poor market intelligence, price volatility of produces etc. which are impediments to enhance the competitive advantage of value chains (Shrestha *et al.*, 2018; Ghimire *et al.*, 2019). The identification of value chain structures, conducts and performances allows the policy makers and agricultural economists to understand the critical linkages and strategic alignments which could be leveraged to enhance competitiveness and eventually local development (Figueiredo *et al.*, 2014). In addition, SWOT analysis identifies both internal (strengths and weaknesses) and external areas (threats and opportunities), which are important to make appropriate strategy (Kolbina, 2015). Therefore, the eclectic approach of linking structure, conduct and performance of value chain combined with SWOT analysis and farm competitiveness analysis was undertaken to assess the competitive position of value chains with possible areas of interventions, which in turn is crucial to enhance productivity and commercialization of the banana subsector.

The paper is structured as follows: Second section presents materials and methodology adopted for the study. Third part provides results and discussion of the study. Final section presents the conclusion and policy recommendation of the study.

MATERIALS AND METHODS

Structure-Conduct-Performance (SCP) framework as analytical tool become more popular through the work of Michael Porters' Competitive Strategy in 1980 (Porter, 2008), though it has been pioneered by the Edward Mason and Joseph Bain for industrial sector, during 1930s and 1950s, respectively (Stuckey, 2008; Bonanno *et al.*, 2018). This framework provides a linear picture describing how conduct of the market based on existing structure impacts on performance of the value chain (Attaie and Fourcadet, 2003). Later, the extended SCP framework developed by Figueirêdo Junior *et al.* (2014) was used to the local value chain as the study unit. The framework is more reliable because the components of porter's diamond are also integrated into the categories of structure. However, the framework should be developed based on local needs and context to design the interventions and achieve success of the value chain (Donovan *et al.*, 2015). We discussed below about many suitable categories that could be included into SCP framework, and how they could be linked to the concept of competitive advantage.

Structure

The discussion of the structure of the agricultural sector starts from the characterization of vertically linked market systems or chains (Sheldon, 2017). The value chain map is itself the static snapshot of combinations of market channels, which shows the interdependencies among the actors to analyze the opportunities and scope of sector within a territory (Springer-Heinze, 2007, Kaplinsky and Morris, 2001; Lazzarini *et al.*, 2001). Market structure within the value chain is another important aspect which is measured by the number and relative size of distribution of buyers/sellers in the market and degree of concentration (or market power). Market power is measured by using various indicators like Herfindahl-Hirschman index, firm concentration ratio and Lerner index. It is generally believed that higher market concentration implies a noncompetitive behavior and thus inefficiency. According to Kaplinsky and Morris (2001), there are three key elements of the value chain analysis viz.,

barrier to entry and rent, systematic efficiency and governance, which are important part of value chain structure. Barriers to entry arises from economies of scale, high cost of production, technological development and product differentiation, which are conditioned by various organizational, institutional and legal measures (Krasnov *et al.*, 2020). Similarly, systematic efficiency stems from systematic integration, meaning closer cooperation between links in the chain, enhanced responsibilities for governors and greater level of trust between chain actors, which have the ability to make an impact on competitiveness (Kaplinsky, 2000, 2004). Finally, governance, first used by Gereffi (1994), is defined as the power to regulate the value chain coordination between buyers and suppliers. Governance is not just about who controls the chain; it also covers how is the rule of game where actors are performing (van Dijk and Trienekens, 2012; Gereffi *et al.*, 2005). Both natural environment and business environment based on institutions, which encompass public policies and regulations, business practices and ethical standards define and delineate the sustainability and competitiveness of the value chain (Trienekens, 2011; Subramanian, 2007).

Conduct

The domination of integrated markets leading to complex value chains has triggered higher product differentiation, product quality and vertical coordination, which are key dimensions to influence the competitive position of agricultural marketing systems (Sexton, 2012). Because of very high interdependencies between vertical and horizontal aspects of agricultural sectors (McCorriston, 2014), the analysis of competition issues is complex. The dynamics of price transmission, market intelligence, pricing strategies and general market behaviors of chain actors play a role in determining the performance of chains (Dessalegn *et al.*, 1998; Enibe *et al.*, 2008). Price stability is considered as a key component of competitiveness especially in agriculture products (Grega, 2002), which is affected largely by seasonal fluctuation of quantity. According to Trienekens (2011), the major factors that could influence the competitive value chain are channel relationships, business environment and organizational arrangement in chains. In other words, non-price aspects of value chains or dynamic capabilities (i.e., coordination, integration, learning and configuration) are highly important in gaining sustainability and market shares (Latruffe, 2010; Teece, 2007). The relationship between actors in the chain could be bolstered by re-organizing the collaboration through the means of relationship marketing, R&D, and market intelligence (Tzokas and Saren, 1997; Bailey and Francis, 2008). In addition, resource endowments like human, physical, technology, knowledge, credit, infrastructure, and external services have greater impact to build business environments (Streeter *et al.*, 1991; Sarris *et al.*, 1999). Besides these, governance factors like institutional innovations (such as contracts agreement, farmer organizations, bodies to verify quality of products etc.), transfer of technology and information diffusion are required as backing forces to upgrade the firms and local chain (Humphrey and Schmitz, 2002; Devaux *et al.*, 2018).

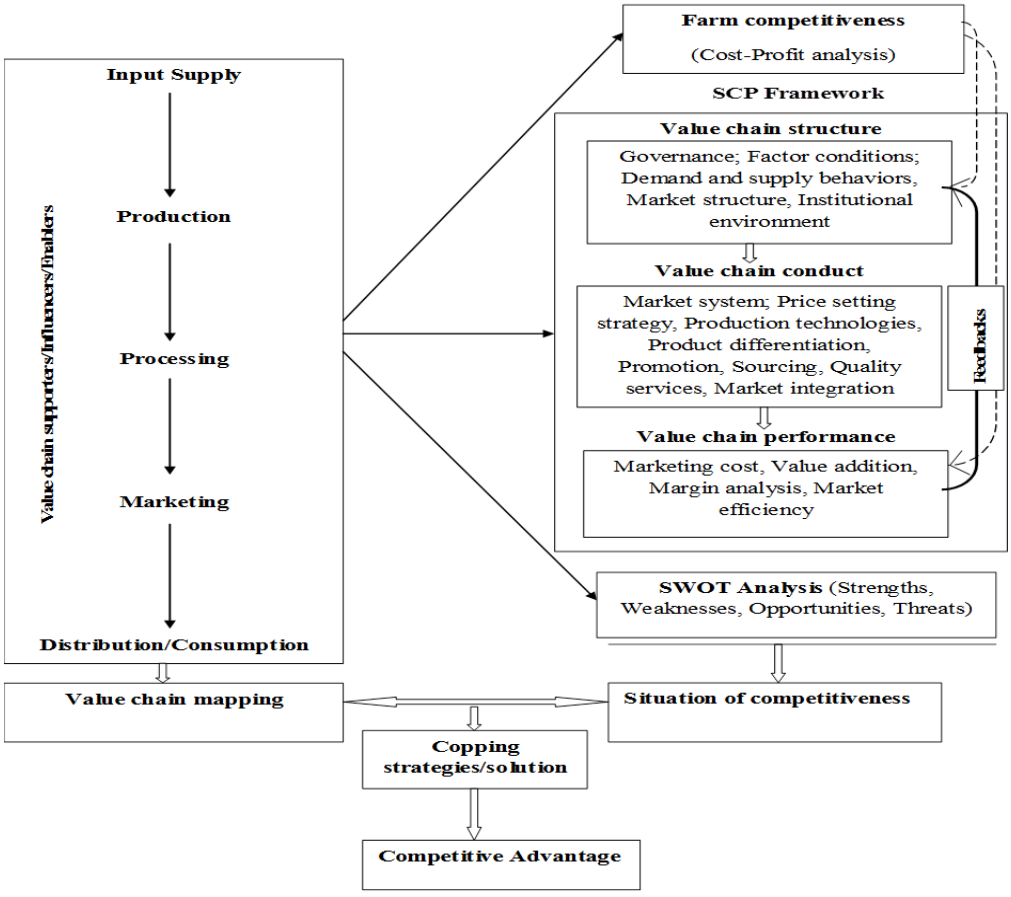

Figure 1. *Conceptual framework to analyze the competitiveness.*

Performance

Performance of value chain could be both qualitative and quantitative based on scope of analysis (Da Silva and de Souza Filho, 2007). Performance is usually measured by productivity, employment generation, profitability of chain actors (Toth, 2012), stability of price, market share (Subramanian, 2007) and market efficiency (Enibe *et al*., 2008). Performance is the evaluation of how well the conduct and structure of value chain are organized to have higher efficiency of production and marketing (Giroh *et al*., 2010). Theoretically, overall performance of the value chain is tantamount to the sum total of performance of each actor. The strategic management of chains based on the resources and internal dynamic capabilities are crucial to gain competitive advantage (Barney, 1991, 2001; Teece, 2007). Thus, the competitiveness of the chain is reflected into performances. In particular, the measures used in assessing the performance of a marketing system are the farmer's/grower's share of the retail price spread; the gross marketing margin or farm retail price and the proportion of a consumer's income spent on food (Gebremedhn *et al*., 2019; Tarekegn *et al*., 2020). The marketing margin is analyzed using the price difference of the actors in the marketing channels. It represents payments for all assembling, processing, transporting, and retailing charges added to the value of farm products after they leave the farm.

SWOT analysis is considered as a qualitative starting point to analyze the competitive position of value chain (Webber and Labaste, 2009). Although it is not a very precise tool, a broad overview of the structure and characteristics of the value chain could be established and also, could become a valuable planning tool if supported by other forms of analysis (Kolbina, 2015). That's why we adopted an eclectic approach and constructed the conceptual framework, as shown in Figure 1, to analyze the competitiveness taking the value chain as a study unit.

Methodology

Hetauda-Dumkibas road corridor (136.7 km) is an important section of Nepal's longest East-West highway (1026 KM), consisting of two major banana producing districts- Chitwan and Nawalparasi East. The corridor contributed about 13% of total production of Nepal (MOALD, 2020) and also has more potentiality for commercial cultivation of bananas. In addition, producers of this corridor produce a Malbhog variety of banana which has a good market reputation. The four major banana producing municipalities of the corridor (two municipalities from Chitwan district and two municipalities from Nawalparasi East district) were taken purposively as study areas. In Chitwan district, the total number of producers registered at Chitwan Banana Producers Associations (CBPA) from Ratnanagar and Khairahani municipalities was 403. In Nawalparasi East district, the number of producers engaged in Kalika Banana Block Implementation Committee of Madhyabindu municipality was around 200. The producers were found to be tentatively 200 in Kawasoti municipality based on discussion with locals and representatives of cooperatives.

Using the formula shown below, 80 producers were selected randomly for household surveys from each of both districts. Besides this, 11 traders and 5 agrovets were also selected from each of both districts, resulting in an overall sample size as 160 producers, 22 traders, 3 wholesale commission agents and 10 agrovets. In addition, four focused group discussions (FGDs) and seven key informant interviews (KIIs) were held with major stakeholders of the banana subsector. FGDs and KIIs helped to understand largely on strengths, weaknesses, opportunities and threats (SWOT) of banana subsectors and to cross verify the information gathered in surveys. The formula used to determine the sample size, as given by Yamane (1967), is as follow:

$$n = \frac{N}{1 + Ne^2} = \frac{400}{1 + 400 * 0.1^2} = 80 \quad (1)$$

Where, n = sample size, N = population size (sampling frame) & e = level of precision considered as 10%.

Mathematical relations used during study

The market structure was calculated by using Herfindahl-Hirschman index (HHI) and firm concentration ratios (CR-L), which are given below:

$$HHI = \sum_{i=1}^{n} S_i^2 \quad (2)$$

$$CR - L = \sum_{i=1}^{L} S_i \quad (3)$$

Where, n is number of suppliers; S (i =1 to n) is percentage of market shares; L is taken as 4 and 8 in this study.

The formulas used to analyze the performance of value chain were given below.

$$GM_i = P_i - \sum_{j=1}^{n} P_j X_j / Y_i \text{ or } P_{i-1} \quad (4)$$

$$TGMM\ (\%) = \frac{P_r - P_p}{P_r} * 100 \quad (5)$$

$$GMM_p\ (\%) = \frac{P_p}{P_r} * 100 \quad (6)$$

The gross marketing margin for intermediaries (i^{th}) is calculated by,

$$GMM_i\ (\%) = \frac{P_i - P_{i-1}}{P_r} * 100 \quad (7)$$

The profitability of value chain could be expressed in net marketing margin (NMM), as given in Scott (1995) which are given below.

$$NM_i = P_i - \sum_{j=1}^{n} P_j X_j / Y \text{ or } P_{i-1} - TMC_i - PHC_i \quad (8)$$

$$NMM\ (\%) = \frac{NM_i}{P_r} * 100 \quad (9)$$

Value added % used by this study is given by,

$$VA_i\ \% = \frac{GM_i}{P_{i-1}} \quad (10)$$

Safi *et al.* (2018) have used the Shepherd's method (Shepherd, 1972) to estimate marketing efficiency by measuring the consumer price with total marketing cost. The formulae used for shepherd's method is given by,

$$\text{Shepherd's marketing efficiency} = \frac{P_r}{TMC_i} - 1 \quad (11)$$

$$\text{Benefit cost ratio (BCR)} = \frac{P_p Y}{\sum_{j=1}^{n} P_j X_j} \quad (12)$$

Where,

GM_i = Gross margin at i^{th} actor; P_i = Price received by i^{th} actor; P_p = Price received by producers; P_j = Price of factors; X_j = Quantity of factors used during production; Y_i = Quantity of produce sold by i^{th} actor; P_{i-1} = Price paid by i^{th} actor; TGMM = Total Gross Market Margin; P_r = Price received by retailers; GMM_p = Gross Market Margin received by producer; GMM_i = Gross Market Margin received by i^{th} actor; NM_i = Net Margin received by i^{th} actor; TMC_i = Total Marketing Cost incurred by i^{th} actor; PHC_i = Postharvest Cost incurred by i^{th} actor; VA_i = Value added by i^{th} actor

RESULTS AND DISCUSSION

Value chain mapping

Within the corridor, we observed two distinct value chain streams having different end markets, which are depicted in Figures 2 and 3. The findings revealed that bananas of Chitwan district were supplied to final consumers through two channels. The major market channel was involved in the transaction of 75% of bananas from producers to the distant markets (Kathmandu, Pokhara, Kavrepalanchowk), which was organized as: Producers – Orchard Contractors – Wholesale commission trader. Another market channel transacting 25% of bananas was organized as: Producers – Local traders – Wholesalers – Consumers. Similarly, bananas of Nawalparasi East were supplied to final consumers through three channels. The main channel involved in the supply of bananas (60%) from producers to the consumption market was organized as; Producers – traders-distant markets. Second market channel supplying 35% of bananas to local consumers was shown as: Producers – Local traders – Wholesalers – Retailers – Consumers. Remaining 5% of banana was supplied directly to consumers from local bicycle and bucket traders.

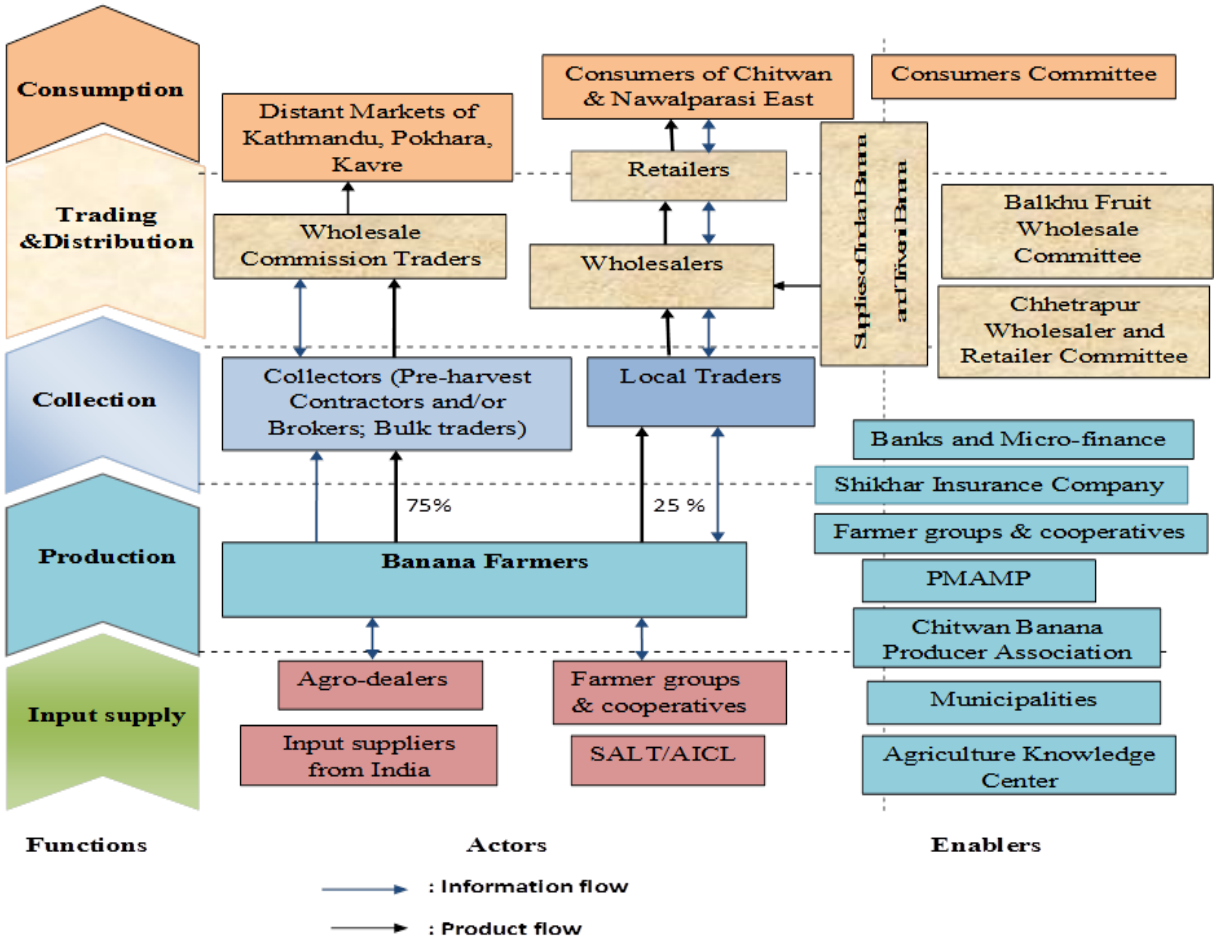

Figure 2. *Value chain map of banana in Chitwan district of Nepal.*

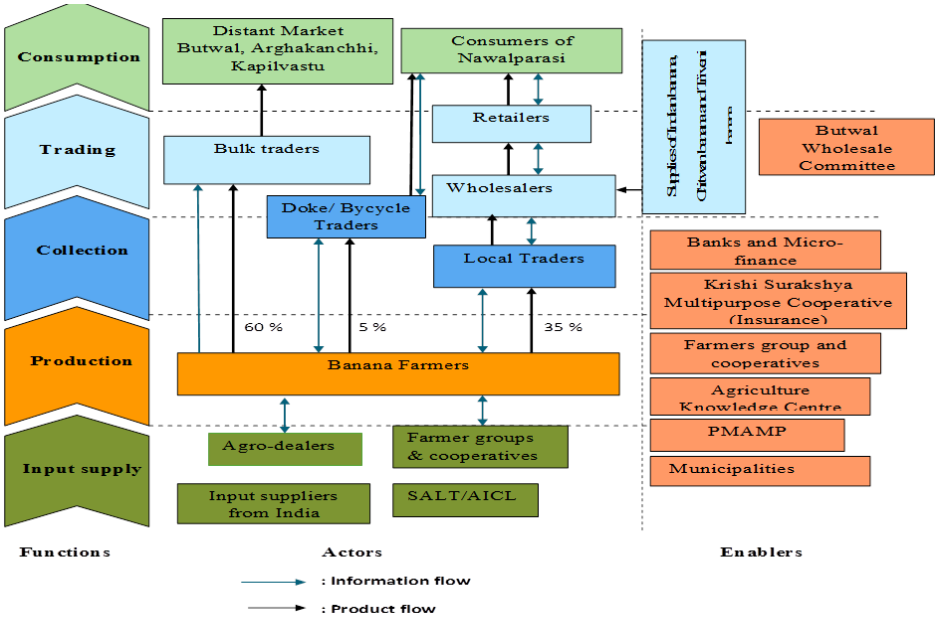

Figure 3. *Value chain map of banana in Nawalparasi East district of Nepal.*

Value chain structure

Discussing factor conditions in banana farming, the replacement rate of suckers was long (8 years) in both districts. About 95% of producers reported that they bought suckers from the fellow farmers. In Nawalparasi East, only 20% of producers had accessibility to irrigation systems, while in Chitwan district 80% of banana producers had accessibility to irrigation because of larger canal irrigation systems. Seasonality had a greater impact on banana production and marketing. The demands and price of bananas were reported to be low in the winter season. About 75% of traders in the corridor reported that Indian bananas affected the market price of Nepalese bananas significantly. The reason behind this was huge scale of bananas were imported at low price especially targeting September, a month of festival Dashain and Tihar. The study conducted by Shrestha *et al.* (2018) in Chitwan district also showed that price fluctuation and seasonality of bananas were major problems of banana markets. It was revealed from focused group discussion with producers that collection traders (contractors or bulk traders) were major value chain governors in the corridor. In addition, findings of concentration ratio and Herfindahl-Hirchhman index showed that the banana market was characterized by monopolistically competitive market structure (Table 1). The banana value chains in the corridor were characterized by low coordination among the value chain actors in information and technical knowledge transfer. Similar results were found by the study of Gotame *et al.* (2008) and Awasthi (2014) claiming that this situation is a major hindrance to equitable market sharing and commercialization in the horticulture sector.

The major entry barriers found in the study area were land accessibility, capital, technical knowledge, market information and price fluctuations. Around 46% of farmers in Chitwan district were found to be interested in expanding banana farming if they get land suitable for banana production. Therefore, the land availability was one of the major barriers to entry. In terms of service deliveries, the Prime Minister Agriculture Modernization Project (PMAMP) has been conducting its various banana related activities like technical training, subsidy schemes, provision of inputs, banana processing etc., through formation of farmer groups and committees. In Chitwan district, farmers were relatively more progressive and tapped the various banking and interest schemes provided by banks. However, the research and development (R&D) part of bananas was poor in both districts. Only a few farmers (2%) were found to cultivate the tissue culture varieties of banana, which were imported mostly from India.

Value chain conduct

A description of conduct of both value chain streams is presented in Table 2. Producers were reported to have sold bananas by numbers (fingers) in the corridor. The means of transportation of resources and produces were bicycle, auto-rickshaw, tractor and trucks depending upon the volume to be sourced. Farmers were found to be sold their produce to collection traders (contractors/brokers/bulk traders) on an informal contract basis. In Chitwan district, these contractors/traders sell bananas to long distant markets, mainly in Fruit Wholesale Market (Kuleshwor), Kathmandu, through a wholesale commission agent. Wholesale commission agents sell through their own channel but don't bear the risk of marketing bananas and take commission at 8% from those collection traders (brokers/contractors) after selling bananas supplied by brokers. Sixty percent of the producers from Chitwan district reported that price setting happened by the force of demand and supply while 31% of producers reported that traders set the price of bananas. Similarly, in Nawalparasi East district, only 18.25% of producers reported that markets themselves fix the price, and 81.75% of producers reported that traders fix the price of bananas. This was partly supported by the findings of ADB (2019), which showed that the price setting mechanism is not transparent leading to imbalance and detrimental to farmers.

Table 1. Value chain structure of banana subsector in the corridor.

Categories	Indicators	Chitwan	Nawalparasi East
Factor conditions	Fertilizers availability	Limited especially at main application time	
	Sucker replacement rate	8 years	
	Access to irrigation facility	80%	20%
Demand and supply behaviors	Supply situation	April to July-55%; August to October- 35%; November to March- 10%	
	Demand	Lowest demand at winter season (November to March)	
Value chain governance	Governor	Collection traders	
	Power relation	Buyer driven	
Market structure	Herfindahl-Hirchhman (HH) index	535.55	465.06
	CR-4	38.34%	34.93%
	CR-8	57.95%	46.36%
Entry barriers	Knowledge and technology	No	Yes
	Land availability & accessibility	Yes	No
	Capital	Yes (Startup capital)	Yes (Startup capital)
	Price risk	Yes	
Institutional framework	Subsidies	Higher than Nawalparasi East	Limited
	R&D	Poor	
	Federation or Board or projects	Chitwan Banana Producers Association and PMAMP (Banana processing and promotion zone)	PMAMP (Kallika Banana Block)

Table 2. Value chain conduct of banana subsector in the corridor.

Categories	Indicators	Chitwan	Nawalparasi East
Product and market system	Selling unit	Fingers	
	Seller buyer relationship	Informal contract system between producers & traders	
	Transportation means	Mini-trucks, auto rickshaw, bicycle,	
	Wholesale commission	8%	-
Price setting strategy	Demand-supply equilibrium responding	69%	18.25%
	Traders fixed price responding	31%	81.75%
Technological adoptions	Adoption of selected technology	Higher adopters	Low adopters
	Initiation of tissue culture sapling	25.00%	8.75%
	Disease resistant varieties	26.25%	10.00%
	Suckers treatment	93.75%	83.75%
	Banana propping	7.50%	16.25%
	Use of PGR	87.50%	83.75%
Price differentiation and promotion	Final products	Almost cent percent table purpose	
Quality supporting services	Insurance service	Satisfactory (38.75% not insured)	No insurance company (87.50% not insured)
	Banking service	Satisfactory	
	Extension services	23.75%	10%
	Training facility	48.75%	27.5%
Vertical linkage	Linkage type	No long term business relationship between producers and traders	
	Production sold to local processor	Few hotels	Not found
Horizontal linkage	Resources procurements	Farmer groups and cooperatives plans for collective procurement	
	Traders	Traders fix price collectively	

Producers of the study area had a varietal advantage of Malbhog, which was quite popular among consumers in terms of its edible quality. The banana based processing plants and product differentiation was nominal in the study area. The technological adoption rate was higher in Chitwan district as compared to Nawalparasi East. The major source of credits was local cooperatives charging an average of 15% interest rate. About 5% producers were found to have taken loans from the banks like Rastriya Banijya Bank (RBB) for banana production at an interest rate of less than 4%. However, others producers reported hesitation for credit, reasons being their lending process involves too much paperwork, and the process is lengthy. About 38.75% and 87.50% of sampled producers were found to be not insured for their bananas in Chitwan and Nawalparasi East district, respectively. The major reasons not ensuring bananas reported by producers of Chitwan were administrative procrastination and tedious process, while producers of Nawalparasi East district were not accessible to insurance service within their district. Findings revealed that 23.75% and 48.75% of the banana producers of Chitwan district had got extension services and training related to banana production, respectively, while these were 10% and 27.5%, respectively, in Nawalparasi East.

In the corridor, the banana value chain was characterized by stronger horizontal linkage and comparatively weak vertical linkage along the stages of the value chain. At farmers' level, there were farmer groups and cooperatives where members regularly conduct meetings and plan for input procurement and output marketing. At market and distributional level, traders were found to fix the price of product collectively for a particular day and transact the banana accordingly. There was minimal involvement of actors in regional and international markets and the product was traded mostly in an unprocessed form. There was found no long-term business relationship between producers and traders. The information and communication flows between farmers and traders were based on trust but not in an extensive way. Producers had good relationships with chain supporters and influencers.

Value chain performance

The performance of the banana value chain was assessed through estimating the marketing costs, marketing margins, value additions, profit margins, and market efficiency which are summarized in Table 3. The profitability of the first season crops of banana farming was 1.79 while it was found 2.16 in succeeding cropping seasons in Chitwan district. Likewise, the benefit-cost ratio (BCR) of the first season crop and succeeding season crops was 1.4 and 1.74, respectively, in Nawalparasi East district. These results were similar to the cost benefit analysis conducted by MRSMP (2017). The numbers of fingers produced by Chitwan producers was higher (156,740/ha) as compared to producers of Nawalparasi East (148,095/ ha), which ultimately led the producers of Chitwan to collect higher revenue also. In addition, the price of bananas taken by Chitwan farmers was higher (NPR 4.97 per finger; 1 USD = NPR 118) than that of price taken by producers of Nawalparasi East (NPR 3.36 per finger). The marketing cost ranged between NPR 0.25 and NPR 0.56 per finger for the intermediaries of Chitwan's value chain stream, while it ranged between NPR 0.24 and NPR 0.50 per finger in Nawalparasi East district. Gross market margin of intermediaries engaged in the value chain of Chitwan was between 6.25% and 27.38% while it ranged between 19.97% and 38.53% in Nawalparasi East. In addition, in Chitwan district, net marketing margin (NMM) taken by intermediaries was between 3 to 28%, while it was 8 to 23% in Nawalparasi East district. The percentage of value added was highest at producers' stage around 78% in the corridor, while it ranged from 8% to 86% at intermediaries' level. The value added at producers' level was found to be higher as compared to market intermediaries.

SWOT analysis

SWOT analysis is the one of the supporting tools used to analyze the competitive position of the value chain. The logic behind SWOT analysis is that the value chain system should focus on its strengths and opportunities, and should minimize the weaknesses and threats. Thus, exploring the factors determining the strengths, weaknesses, opportunities and threats helps to find out the effective strategies to increase the competitiveness of the value chain, which is shown in Table 4.

Evaluation of value chain competitiveness

Based on the discussion with KIIs and focused group discussions, we attempted to identify the linkage of performance with the conducts and underlying structure, which helped to understand the competitiveness of the value chain (Table 5). At the producers' level, Chitwan district was found to be a better performer because of higher benefit cost ratio. The farm gate price taken by Chitwan district farmers was also higher as compared to Nawalparasi East district. This showed that farm level competitiveness was higher in Chitwan district. For this, the major likely contributing factors could be higher access of producers to extension service, training, insurance services and technological adoptions in Chitwan district. The possible underlying supporting structure could be higher involvement of institutions working for the banana subsector. Likewise, at the market level, Nawalparasi East was a better performer. Market margin, market efficiency and value added were higher in Nawalparasi East district. The likely reasons for this were shorter chains and low level of transportation cost. The likely underlying structure was a higher level of competition between traders.

Table 3. Value chain performance of banana subsector in the corridor.

Categories	Indicators	Chitwan	Nawalparasi East
Profitability	First season BCR	1.79	1.4
	Next crops BCR	2.16	1.74
Productivity	Fingers per ha	156,740	148,095
	Gross income per ha (NPR)	779,763.9	498,142.9
	Farm gate price per ha (NPR)	4.97	3.36
Marketing cost	Total marketing cost per finger at intermediaries (NPR)	NPR 0.25 to 0.56	0.24 to 0.50
Market margin	GMM (%)	6.25 to 27.38	19.97 to 38.53
	NMM (%)	3.13 to 27.38	8.53 to 35.20
Market efficiency	TGMM (%)	37.87	46.24 to 55.20
	GMM (%)	62.13	44.8 to 53.76
	Shepherd index	4.12	6.5 to 24
Value added	At producer level	78.78	79.68
	At intermediate level	8.65 to 27.39	25 to 86.01

Table 4. SWOT analysis of banana value chain.

Strengths	**Opportunities**
• Suitable agro-climate for banana production. • Infrastructure development: Accessible highway; institutional set up for research, teaching and extension (Agriculture and Forestry University, Polytechnic Institute- Purbanchal University). • PMAMP has specified Ratnanagar, Khairahani, Kallika and Bharatpur as banana production zones while Madhyebindu municipality as a block. That means banana production has been recognized and high potential cash crops in this corridor. • Perennial crop and long productive life. • Traditional knowledge and experience of farmers in banana production.	• Export potentiality because of East-West highway. • Increasing demand of bananas due to nutritional and health consciousness. • Employment generation and reduces outmigration. • Several donors funded projects providing support for better access to market e.g., VCDP of UNDP. • Higher product processing and differentiation. • Contract farming in banana production and commercialization • Emerging technologies like mini tillers to control weed, banana cleaning machines, etc.,
Weaknesses	**Threats**
• Inadequate supply of quality planting materials (improved sapling, tissue cultured varieties) and absence of nursery. • Improper orchard management including manuring, fertilization and plant protection. • Poor research and support for banana production. • Poor mechanization. • Not enough processing industries/unit. • Poor record keeping system. • Low coverage of insurance companies. • Lack of market intelligence/price information system. • Farmers lack their own organized marketing unit and selling on contract basis (or may be called as informal contract) basis with brokers/traders. • Inconsistency in quality product. • Seasonality in supply and demand of banana, and so in price. • Banana pests and diseases, e.g. banana weevil, Panama disease, Sigatoka disease reduce farm yields and consequently production, causing farm revenue losses.	• Out migration of youth and labor unavailability • Panama wilt and Sigatoka disease has been costing the farmer extremely. • Highly price fluctuation of banana, depending upon Indian banana. • Extreme weathers condition (heavy raining, long drought, hailstorm) • Uncertainty of fertilizers availability especially urea and high price fluctuation at same time.

Table 5. Evaluating competitiveness by linking structure, conduct and performance.

Performance indicators	**Better performer**	**Likely contributing conducts**	**Likely supporting structure**
Profitability and productivity	Chitwan	• Higher access to extension services • Higher level of training • Insurance services • Higher adoption of production technologies • Higher record keeping practices	• Technical knowhow is not entry barrier • Higher level of subsidies • More involvement of institutions (cooperatives, groups, associations etc.,)
Market margin; value added and market efficiency	Nawalparasi East	• Short chain and lower transportation cost • Distribution of more percent (40%) of banana within same district and peripheral districts	• Low index of HH and CR-7/CR-8 shows higher competition

Conclusion and policy recommendation

The paper applied the eclectic approach to analyze the competitiveness of the banana value chain in the corridor. The two different value chain streams were found in the corroder having different end markets. Majority of structure indicators were similar for both value chain streams. This is possibly because of the corridor having similar kind of social demographic and economic structures. However, the involvement of institutions as facilitator and influencer working in the banana subsector were relatively higher in Chitwan district. Conduct indicators like technological adoption rate and supporting services like insurances, extension, and training were better in the value chain stream of Chitwan district as compared to Nawalparasi East. Performance of farmers was better in Chitwan district because of higher BCR as compared to Nawalparasi East. However, market channel of Chitwan was less efficient than the channel of Nawalparasi East when compared taking reference of producers' share on consumer price (GMMp), efficiency index and total gross market margin (TGMM). Based on the study 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. At marketing level, value addition, processing, and promotion should be the concern of policy makers and entrepreneurs to increase competition among traders. The donors and development practitioners could take measures like cooperatives and group mobilization approach, market price dissemination through mass media or mobile technology/software and subsidies and support scheme to value addition process, which in turn could strengthen performance of the banana value chain streams in the corridor.

Contributions

All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Manoj Sharma. The first draft of the manuscript was also written by Mr. Sharma, and all authors commented on it. All authors read and approved the final manuscript.

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Conflict of interest

The authors declared that they have no conflict of interests.

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