



## Research Article

# Value Chain Analysis of Honey Sub-sector in Nepal

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### Article Information

Received: 15 February 2020

Revised version received: 16 March 2020

Accepted: 19 March 2020

Published: 29 March 2020

#### Cite this article as:

P.L. Bhandari and R.R. Kattel (2020) Int. J. Appl. Sci. Biotechnol. Vol 8(1): 83-95.

DOI: [10.3126/ijasbt.v8i1.27804](https://doi.org/10.3126/ijasbt.v8i1.27804)

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Peer reviewed under authority of IJASBT

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**Keywords:** Beekeeping; Honey; Value chain analysis; Nepal

### Abstract

Beekeeping is a low investment and low input business enterprise with immediate return. However, very few researches has been done on value chain analysis of honey sub-sector in Nepal. Such a backdrop, this research gauges the value chain of honey in Nepal focusing value chain function, actors/products flow and enabling business in 2018. Both primary and secondary information were collected using different research instruments in 2018. This study revealed that *Apis cerana* was the major honey-bee reared in Pyuthan district and about 50% youth were engaged in beekeeping business. Each household have an average of 32 hives ranging from 15 to 80 hives. Average 32 kg honey was consumed at HHs level and 239 kg was sold. The average wholesale rate of honey at farm gate was about NPR 400-450 (USD 3.6-4.1) per kg with the retail price rate was NPR 500 (USD 4.5). An average income earned from honey sale was NPR 60000 (USD 545) per annum ranging from NPR 20000 to 120000. Majority of the beekeepers received training whereas none of them have done insurance. About 55% of the beekeepers have taken loan from saving groups and cooperatives or MFIs. There has not any provision of grading, processing and labelling of the product at producer's point in the study area. The main threats of beekeeping came from loss of habitat, disease, pest and enemies. This research suggests to develop upgrading practices with facilitation of basic value chain practices for promotion of high-quality Nepali honey at global markets.

### Introduction

Beekeeping has been in practice since an ancient time in Nepal. Beekeeping has been identified as a useful income generating option in particular poor and landless farmers as it requires minimal start-up investment, can be carried out in a small space close to the house, and generally yields profits within the first year of operation Nepal's diverse climatic conditions and abundance of rich floral diversity make it one of the potential countries for massive scale

beekeeping. Thus, it has the potential to transform thousands of lives of Nepali people with proper utilization of traditional knowledge and sustainable use of natural resources prevalent throughout the country. Commercialization of beekeeping started in Nepal started with introduction of *Apis mellifera* breed in Terai and low hilly areas, its farming and colony migration practices. As the demand for honey is increasing in the domestic, regional

and international markets, there are lots of opportunities to promote beekeeping in Nepal to meet those demands. In recent years beekeeping has been recognized as a key sector towards poverty alleviation, livelihood improvement and nutrition.

Only from 2000 AD, commercialization of beekeeping started with introduction of *Apis mellifera* breed in Terai and low hilly areas, its farming and colony migration practices. As the demand for honey is increasing in the domestic, regional and international markets, there are lots of opportunities to promote this sector in Nepal to meet those demands. In recent years beekeeping has been recognized as a key sector towards poverty alleviation, livelihood improvement and nutrition.

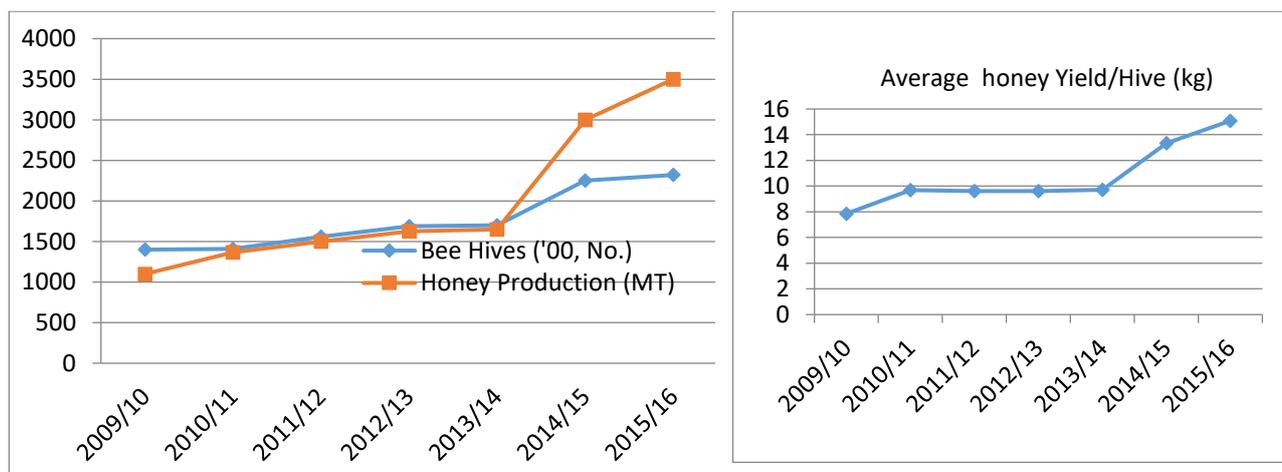
The best known primary products of beekeeping are honey and wax in Nepal. However, pollen, propolis, royal jelly, venom, queens, bees and their larvae are also marketable primary bee products in the country. Most of these products can be consumed as they are produced by the bees. Most of the honey produced in Nepal is sold in the domestic market as food and for ayurvedic medicine, with only a very small quantity being exported. The major honey producing districts of Nepal are Chitwan, Nawalparasi, Rupandehi, Kapilbastu, Dang, Sarlahi, Sunsari, Mahotari, Makwanpur, Banke, Bardia and Kanchanpur.

Honey is the natural sweet substance prepared by honeybees from nectar of flowers or natural plant secretions or insect excretion on plants after combining these with some of their own specific substances and stored in honeycombs for maturation and ripening (CAC, 2006). It has the potential to transform thousands of lives of Nepali people by making use of natural resource in sustainable manner.

Honey production is successfully acquired in a wide range of area i.e. from 70 to 4,200 meters above sea level in Nepal (Joshi, 2008). Considering its wide range of variation in altitude, climatic conditions and rich in plant and floral diversity which consequently produces a wide variety of specialized honey and has its own unique flavour. Even with such diversity, Nepali honey has not been able to establish a significant position in the world market with mere 0.05% share of honey in world (FAOSTAT, 2014).

It is estimated that Nepal has potentiality to produce over 10,000 MT of honey annually along with a capacity to hold one million beehives (Pokhrel, 2009) but, only 3,500 MT of honey was produced with 232,000 beehives in Nepal during the FY 2015/16. However, the trend of honey production within the past six years (2010 to 2016) has been increased by 218% whereas beehives increased by 66%. Due to its potential to increase income and growing demand for honey, growing number of farmers are engaging in keeping bees as a means of additional income generation that has led in increase in production of honey by 20% per year (MoAD, 2017).

The raise in number of farmers keeping bees as a means of additional income generation has led in increase in production of honey by 20% per year. Currently, Nepal only exports only around 4 MT of honey for which it gets a good price but it imports about 300 MT annually to meet the domestic demand. This clearly shows that honey has both export orientation and import substitution potentials in the country. Recognizing the potential and its unique selling point, Nepal Trade Integration Strategy (NTIS, 2016) has identified honey as fifth important commodity (MoC, 2016).



**Fig. 1:** Trend of honey production (MT), number of hives ('00 No.) and yield per hive (kg/hive) in Nepal  
Source: MoAD (2017)

Inadequate bee research program, data on bee floral identification, pesticide use, low product quality control, low quality management of bees, colony migration and disappearance are major constraints for beekeeping in Nepal. These constraints among others hamper the productivity of honey. Lots of opportunities in beekeeping can be tapped by designing effective honeybee pests and predators controlling measures, introduction of full package improved beekeeping technologies with adequate practical skill.

Value chain analysis encompasses the full range of activities and services required to bring a product or service from its conception to sale in its final markets – whether local, national, regional or global (Chapagain *et al.*, 2014; Kaplinsky and Morris, 2002). National and international chains linkages and boundaries and buyer's requirements are known with the help of value chain analysis. It further gives information about the international standards and can well be used as a tool for international benchmarking (Richter, 2005). It helps in analyzing the links and flow of information within the chain. This paper provides information on present status of beekeeping, potentialities for honey production for improving livelihoods in Nepal with specific focus on Pyuthan district.

In this context, overall objective of this paper was to assess value chain analysis of honey sub-sector in Nepal. Specific objectives of this study were as followed:

1. to analyse production systems, opportunities and constraints of beekeeping in Pyuthan district,
2. To assess value chain alliance and financing of honey sub-sector in the study area, and

3. to analyse the potential intervention strategy of honey sub-sector

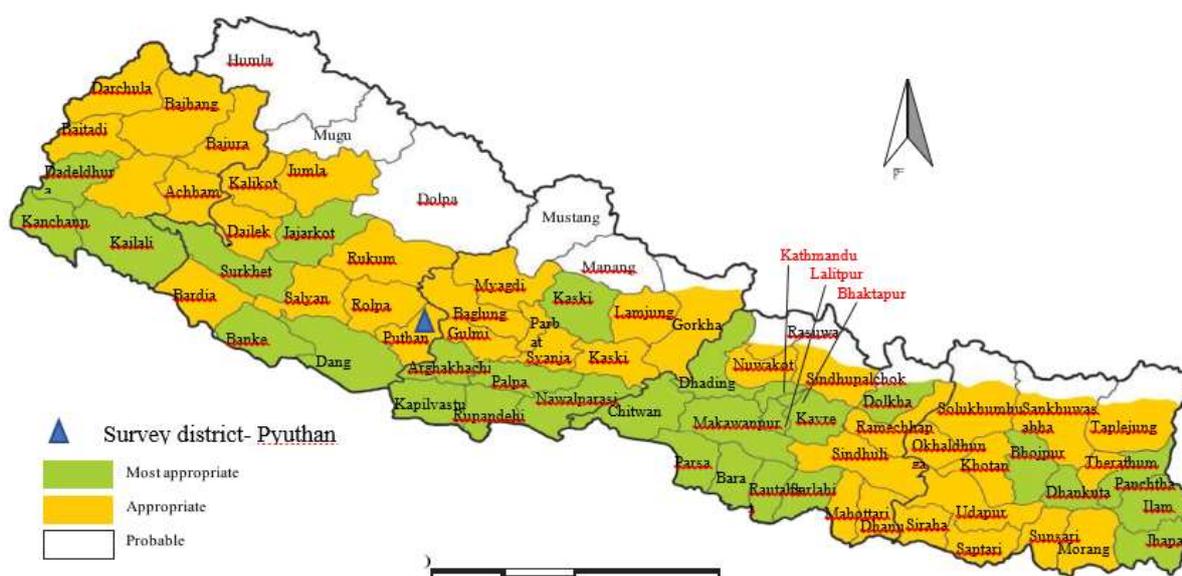
## Materials and Methods

### Data and Data Collection Method

Both quantitative and qualitative methodologies were used to collect necessary information from value chain actors and enablers at different stage of honey chain were analysed. A comprehensive value chain analysis of the honey sub-sector from Poverty Alleviation Fund (PAF) beneficiaries of Pyuthan district of Nepal have been involved directly or indirectly (Fig. 2).

The team undertook study in PAF district of Pyuthan for honey and it found 96 households under PAF intervention were involving beekeeping and they were producing average 30 kg honey per hive having 5-10 hives per household. Under PAF intervention, 26 community organization (CO), 774 households (HHs) and 4,979 people were involving for beekeeping in several districts of Nepal.

Pyuthan district was selected purposively for the survey as it is known as traditional beekeeping and honey production district as well as being the PAF programme implementation district. Within Pyuthan district, Dhungegadhi, Hansapur, Tiram, Markabang, Pakala, Kochibang, Sari, Belbas, and Bijubar were the potential pocket areas for honey (DCC Pyuthan, 2018). Among development programmes PAHAL, KISAN, INCLUDE programme were some of the donor funded programmes in the district. These programmes were mentioned by the FGD participants as well as KII participants.



**Fig. 2:** Map showing study district, availability of bee grazing flowering source and their availability in Nepal  
Source: Beekeeping Directory (2016)

**Table 1:** Status of partner organization (PO), community organizations (Cos), households, gender and population in study districts

Status	Achham district	Pyuthan district	Total
Partner Organization (PO) Name	FECOFON	Kalimati Rural Development Society of Nepal	
Total COs	6	20	26
Total HHs	231	543	774
Men	665	1876	2541
Women	646	1792	2438
Population	1311	3668	4979

Source: PAF annual report (2016)

Questionnaires and checklists were developed and used for all value chain actors, enablers including inputs suppliers, producers, collectors, processors, wholesalers and retailers in value chain function. In this context, this study was conducted in Pyuthan district using focus group discussion, key informant interview with honey producers, collectors, and rapid market survey was conducted with honey processing enterprises as well as traders at regional to national market hubs in 2018. Visits were also carried out to agencies like District Agriculture Development Office (DADO), Agriculture Service Centre (ASC), District Chamber of Commerce and Industries (DCCI), Cottage and Small Industry Development Board (CSIDB) in Pyuthan and discussions were held with the key officials.

In addition, value chain development (VCD) alliance and financing detail checklist was used to pocket products community organization (CO) members, cooperatives, Micro-financing institutions (MFIs) and banks. Two FGDs were conducted. Cost-benefit analysis, business potential, gap and stakeholder analysis, value chain mapping, end market assessment, product, chain, function and process diversifications, potential value chain development alliance and financing models and intervention were assessed in this study. Furthermore, both backward and forward linkage and horizontal and vertical integration of honey sub-sector were judged based on Poverty Alleviation Fund (PAF) Future Strategy, growth and value chain development potential for business promotion in a sustainable manner.

#### **Method of Data Analysis**

Since several value chain studies were carried out in Nepal in the past by numerous institutions, desk reviews were also conducted to obtain secondary data to ensure validation as well as to avoid the overlap. Desk review, group discussion (with producers using focus group discussion), key informant interview (with input suppliers, key model farmers, collectors, traders, processors, institutions and other VC market chain actors, enablers), rapid market

appraisal (with commodity traders and wholesale market) and case studies were used as a VCA study technique using participatory learning and action (PLA) approach. The SWOT analysis, value chain map, backward and forward linkages with margin of all the actors in the value chain with recommendation mentioning the bottlenecks, opportunities, key leverage points and intervention strategy were assessed for each commodity. The Statistical Package for Social Sciences (SPSS) was used to analysis data. Descriptive statistics and value chain analysis tools were used to analyse data.

#### **Approach of Data Gathering**

The study was conducted in collaboration with Ministry of Agriculture and Livestock Development (MoALD), Ministry of Industry Supplies and Commerce (MoISC), Ministry of Forests and Environment (MoFE), and MEDEP, other concerned stakeholders/line agencies focusing the core issue in the Agriculture Development Strategy 2015-2035 (ADS, 2014).

## **Results and Discussion**

#### **Production and Marketing Context**

Beekeeping is practiced around the world and can provide a valuable source of income to people in developing regions with relatively little investment. Global honey market revenue amounted to US\$ 5,850 million in 2015, growing by +2.1% against the previous year. An increase in global honey production was primarily driven by income growth, popularity of healthy eating, and population growth. Furthermore, these key drivers are expected to continue promoting the honey output in the immediate term. In 2016, global production of honey was about 1.8 million MT, led by China with 27% of the world total. Other major producers were Turkey, United States, Russia, India and Ukraine (refer Table 2 and Table 3).

**Table 2:** Top countries producing and consuming natural honey in 2016

Top 6 countries producing natural honey in 2016			Top 10 countries consuming the most honey in 2016		
Rank	Country	Production (‘000 MT)	Rank	Country	Consumption (‘000 MT)
1	China	491	1	China	344
2	Turkey	106	2	USA	240
3	United States	73	3	Turkey	103
4	Russia	70	4	Germany	85
5	India	61	5	Russian Federation	64
6	Ukraine	59	6	Iran	46
	World	1787	7	Ethiopia	42
			8	United Kingdom	40
			9	Canada	39
			10	Japan	36

Source: FAOSTAT (2016)

**Table 3:** Major importing countries of natural honey in 2016

Rank	Country	Quantity in MT	Value in US\$ million
1	USA	1,66,477.00	423.00
2	Germany	81,959.00	260.00
3	Japan	48,445.00	158.00
4	France	35,520.00	127.00
5	U K	41,135.00	120.00
6	Belgium	26,509.00	74.00
7	China P RP	6,032.00	73.00
8	Italy	22,568.00	72.00
9	Spain	27,988.00	65.00
10	Netherlands	16,348.00	57.00

Source: COMTRADE, United Nations (2016)

Honey is emerging as export products of Nepal, exporting mainly Bangladesh, China, UAE, Malaysia and Japan. As honey is being used for food industry, pharmaceutical companies and cosmetic manufacturers, there is flow in export of honey. In some cases, they also export to U.K., Republic of Korea, Germany, Japan, Hong Kong and Poland with further processing and value addition. Data shows that the quantity of honey exported to Bangladesh was 60320 kg with a value of NPR 10.44 million. The quantity of honey exported to Czech Republic was only 4 kg with the value of NPR 5716.

Data shows that the quantity of honey exported in 2009 was 118959 kg while the export in 2017 was 396435. The increase of export was by 30%. The value of exported honey in 2009 was NPR 15.15 million while the value in 2017 was NPR 77.03 million and the value was increased by 20%.

Baddanda is known as a beekeeping village. The beekeeping farmers in the areas are organized into a cooperative named as Airawati Bahuuddesiya Sana Kisan

Sahakari Sanstha (Airawati Multipurpose Small Farmer's Cooperative Ltd.). The cooperative has 1100 members. As *Apis Cerena* is indigenous species of the district and adapts well in weather and temperature throughout the year, out of 1100 members about 300 HHs are engaged in *Apis Cerena* bee farming and about 7 HHs are engaged in *Apis mellifera* bee farming. Honey from both *A. mellifera* and *A. cerana* is available in different plastic pots (250g, 500g, and 1kg) or loose. During the months July- August, the honey from cooperative is too moist and produces a type of foam that makes the honey look bad and slightly bitter. The cooperative representative has noticed the increasing demand of *Rudilo* honey in the local market. The cooperative has its own shop to sell all its products; the cooperative honey is usually sold there un-labelled.

Mostly local honey is sold in the cooperative, road head market and from there it goes to departmental stores as well as for ayurvedic purposes. In many cases beekeepers directly sell their product to the middleman in the market if they get higher prices than from the cooperative. The

cooperative has four permanent staff and 146 members involved in the honey production. The production of honey counts about 35% of the total goods produced and/ or sold by the cooperative, the rest being ginger and other agricultural products. As all the production is sold without much problem, the representatives of the cooperative never felt the need to keep records.

The beekeepers are facing challenge as *Chiuri* plants are dying due to over exploitation as fodder for animal husbandry that represent a large part of the district. The use of pesticides in agriculture crops not only reduces the number of flowers to feed the bees but also increases occurrence of diseases for the bees themselves. The treatment of bee also face difficulties since farmers are not aware about the bee diseases. Some processors labelled honey with its different flavours like *Chiuri* honey, *Rudilo* honey, Mustard honey and buckwheat honey etc.

The retail price of honey has remained constant for last 6 years, due to the system of in-migration of bees from Dang, Salyan and other parts of the country. From October to January in-migration takes place, at this time of the year they harvest honey and have to sell it a cheaper price.

Majority of the beekeepers have received training. However, the quality of the training was questioned. None of the beekeepers have insured through insurance company. The central beekeeper's association-initiated discussion with insurance company, IME Insurance Company. However, it is not finalized yet. About 55% of the beekeepers have taken loan through saving groups and cooperatives or from micro-finance institutions. No one has taken loan from commercial banks. Beekeepers have formed their own groups and cooperative. However, functioning of the groups and cooperatives and governance is in question. Partner organizations (POs), Community Organizations (COs), and Coverage through honey sector in Poverty Alleviation Fund (PAF) area is presented in Table 2.

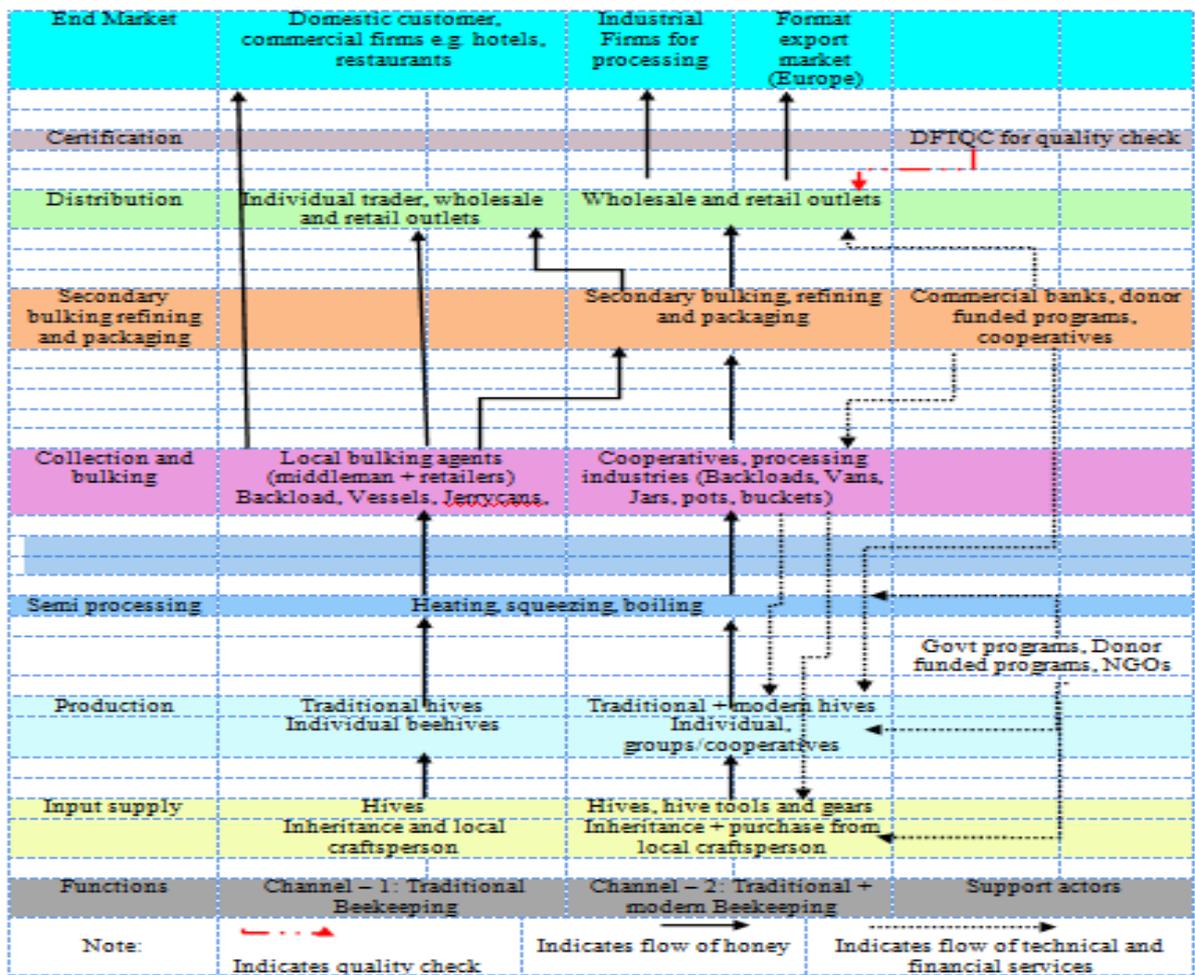
### **Value Chain Mapping of Honey Sub-Sector**

Beekeeping and trade of honey and honeybee products involves various actors among the beekeepers, hive producers, bee breeders, equipment suppliers, honey processors and traders. The core problem for this sector is the lack of effective value chain linkages among the value chain actors and service providers. Most of the honey produced in Nepal is distributed straight from the beekeepers/honey hunters to the consumer. Honey is generally sold individually by beekeepers to small shops and private customers. Limited processing takes place other than heating, sieving and packaging in used bottles. Traditionally, beekeepers work the role of multiple actors and perform two or more functions in value chain. They

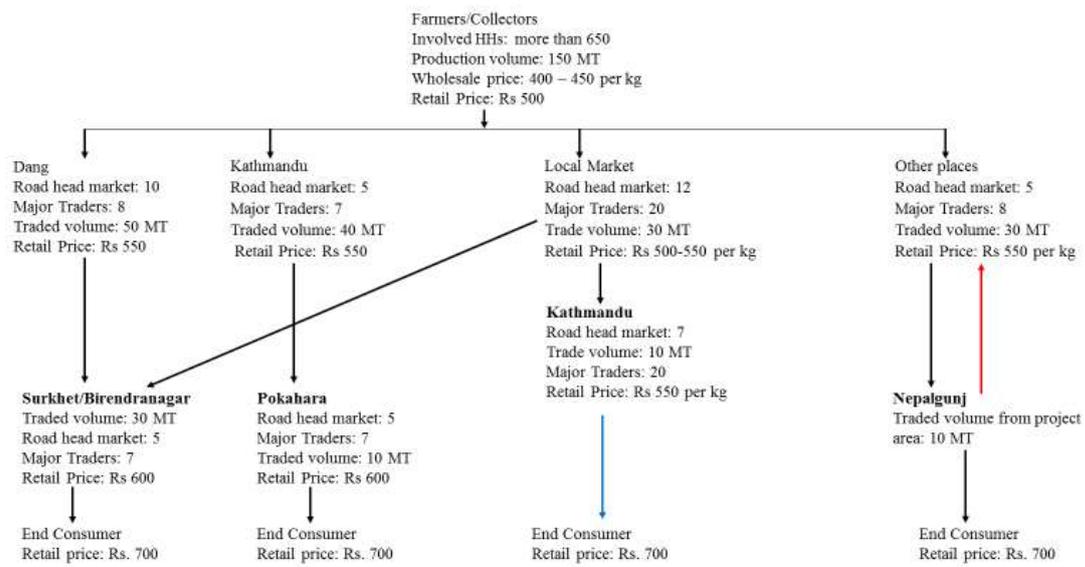
make their hives out of locally available materials, catch and hive swarms, manage bees, harvest and process honey, package and sell to the consumers. The market survey/baseline conducted in Pyuthan district revealed that most of the consumers prefer loose pack unbranded honey from the producers they know personally. At some places, middlemen or bulking agents buy honey at farm gate from farmers and sell to honey processing firms. Some large-scale producers who are organizing in cooperatives sell their produce to cooperatives. There are departmental stores at Kathmandu, Pokhara and in other major cities to take care the retailer level trading. There is a chain of marketing sales outlets throughout the country owned by departmental stores such as Bhatbhateni, Big Mart, Namaste, Blue Bird etc.

The flow of honey and other bee products in the market and distribution of income from consumers to beekeepers/input suppliers is depicted in the value chain map (Fig. 3 and 4). This map consists of three elements: functions, actors and supporters. The enterprises performing the basic functions of a value chain are actors. At one stage in the value chain, they become owners of the (raw, semi-processed or finished) product and at the latter provide support services and represent the common interests of the value chain actors. The supporters remain outsiders to the regular business process and restrict themselves to temporarily facilitating a chain upgrading strategy. Typical facilitation tasks include creating awareness, facilitating, strategy preparation and action and the coordination of support activities.

Small scale individual producers sell their honey directly to the consumers. Selling honey at a roadside stall or market can bring the advantages of long opening hours and plenty of passing trade, without the overhead costs of a shop. Some large-scale producers who organized into cooperatives, they sell to cooperatives. There are department stores at Kathmandu, Pokhara and in other major cities to take care of marketing aspect of honey. There is a chain of marketing sales outlets throughout the country owned by department stores such as Bhatbhateni, Big Mart, Namaste, Blue Bird etc. These are the end markets comprising of the domestic consumers, who use honey as table food, and the industries that use honey in food processing and preservation. There are few export companies who sell their products to other countries. Nepali honey is not yet available in sufficient quantity and quality for export market. Nepali honey accounts for 45% of the total consumption in the country. Nepal Honey, Himalayan Honey, Gandaki Honey, Gorkha Honey, Namaste Honey, Shakti and Himali Honey are some of the top brands of honey in Nepal. Nepali honey has been competing with Indian brands like Dabur Honey and Patanjali Honey.



**Fig. 3:** Value chain map of honey in Nepal  
 Source: Literature review and field survey, 2018 in Pyuthan



**Fig. 4:** Supply of honey from Puythun district to major market hubs of Nepal  
 Source: Field study (May, 2018)

**Analysis of Opportunities and Constraints**

This analysis is the outcome of a stakeholder’s consultations organised during the study period. Table 4 analyses the strengths, weaknesses, opportunities and

threats facing the honey sector in Nepal from production and marketing perspectives are illustrated in Table 5.

**Upgrading Intervention Strategy of Honey Sub-Sector**

Table 6 shows the opportunities and constraints analysis based on the upgrading strategies:

**Table 4:** Opportunity and constraints of honey sub-sector

Opportunity	Constraints
<ul style="list-style-type: none"> <li>• High demand for honey and its by-products at national, regional and international market.</li> <li>• Availability of potential investors like MFI, saving and credit schemes etc.</li> <li>• Availability of flora.</li> <li>• Existence of a National Beekeeping Policy.</li> <li>• Priority sector by the government and development organisations willing to support the sector.</li> <li>• Availability of input suppliers and local craftsman making improved hives and protective equipment.</li> <li>• Product differentiation.</li> <li>• Pro-poor business.</li> <li>• International market exists. Increase of domestic consumption and high demand from countries with high purchasing power.</li> </ul>	<ul style="list-style-type: none"> <li>• Low level of knowledge of beekeeping and post-harvest handling practice.</li> <li>• Use of traditional hives and low level of modern beekeeping practice.</li> <li>• Not commercialized and no sustainable supply of honey and bee products.</li> <li>• Unstructured trade characterized by weak implementation of standard rules and quality assurance systems.</li> <li>• Low level integration with different actors.</li> <li>• Low level of economies of scale.</li> <li>• Low productivity and quality.</li> <li>• Poor packaging due to inadequate availability of good and affordable packaging material.</li> <li>• Low entrepreneurial and management skills of actors.</li> <li>• Minimum investment capacity of the producers.</li> <li>• Inconsistency in the quality of honey. Lack of standard/uniformity of honey. Difficult for market information providers.</li> <li>• Limited number of technicians and other extension workers.</li> <li>• Absence of proper equipment and laboratory facilities to assure quality.</li> <li>• Cost of honey production is high, which makes it difficult to compete with Indian and Chinese honey.</li> <li>• Limited knowledge on commercial operations by groups of producers.</li> <li>• No strategy to promote the product abroad or generate new markets.</li> <li>• Insufficient development of differentiated products.</li> <li>• Unfair competition in the internal market (adulteration, retail sales without registration or controls, sales as homemade on roadsides and other spaces without sanitary controls).</li> </ul>

Source: Field study using FGD (2018)

**Table 5:** SWOT analysis of honey sub-sector

Strength	Weakness
Favourable climatic conditions, good number of producers integrated into processing, availability of tested and relatively affordable improved bee hives and practices, unique taste with good demand in international market	Dominancy of traditional hives and management practice, unstructured trade with poor inter-link, smaller size of production, low entrepreneurial and management skills of actors, poor adoption of insurance
Opportunities	Threats
Honey has social acceptance as food and medicinal product, high demand of unprocessed honey, wide biodiversity in Nepal, keen interest of financial institutions and high demand from international	Mono-cropping, high use of pesticides, Import of cheap honey from other countries, existence of adulterated and fake honey in the domestic market, large number of retailers who present themselves as producers.

**Table 6:** Upgrading intervention strategy of honey sub-sector

Value chain level	Situational analysis	Opportunities for Upgrading	Constraints to Upgrading	Intervention activities
End market	Stagnant/ short growth due to inputs (queen bee and others)	Increasing productivity with quality	Low level of knowledge and access to quality inputs	Scale up of honey production through commercialization of the value chain. Awareness raising and supply of quality inputs (queen bee) after production of quality queen bee through the project
Business enabling environment	Inadequate policy facilitation	Facilitation for export friendly procedures	Inadequate policy lobby and advocacy	Joint activities with other stakeholders and service providers for Policy lobby and advocacy activities
Vertical linkages	Weak existing chain	Formalizing the existing chain	Informal and weak business transaction	Strengthening the business deal through brokering activities by aggregating cooperatives and then coordinating with other stakeholders through project funding
Horizontal linkages	Weak existing chain	Formalizing the existing chain	Farmers mobilization activities	Rooms for strengthening
Supporting markets	Support system available but not accessed by bee keepers	Formalizing the existing chain	Weak linkage amongst farmers and service providers	Linking small holders and service providers by the cooperatives through business networking activities with support from the project
Value chain governance	Weak existing transaction mode and cooperation	Formalizing the existing structure	Increasing Stakeholders participation and business growth	Business linkage programs for actors of the value chain through the support to strengthen their governance
Inter-firm Relationships	Increasing cooperation and institutional development	Developing joint programs	Inadequate sharing and networking programs	Conducting business networking programs through the project to improve coordination amongst the firms involved

Source: Field study using FGD (2018)

### **Environmental Analysis**

Nepal currently produces around 2050 MT of honey against the potential to harvest at least 35,000 MT annually. Nepal Trade Integration Strategy 2010 has also listed honey among the 19 major exportable items, but the policy to encourage producers has not been so effective. Although beekeeping is gaining popularity and more and more farmers are taking it up, Nepali honey has not been able to meet the demand of the domestic market. Nepal has been importing honey from India and other countries to fulfil the domestic requirement. Nepali honey accounts for 50 percent of the total consumption in the country. Many traders have started branding and packaging their products. Nepal Honey, Himalayan Honey, Gandaki Honey, Gorkha Honey, Namaste Honey, Shakti and Himali Honey are some of the brands in Nepal that have been competing with Indian brands like Dabur and Patanjali Honey.

According to the beekeeper's association, more than 50,000 farmers are directly and indirectly involved in honey production, while there are more than 100 cooperatives maintaining 25-300 beehives each. As beekeeping is largely affected by climatic conditions, due to lack of training and knowledge on improved beekeeping practices, farmers have been unable to expand their farms. The banks and financial institutions were also reluctant to issue loans to beekeepers.

Despite the huge potential in the domestic and international markets, Nepal have not been able to tap it. The various types of honey sold in the market are mustard, millet, *chiuri*, *rudilo* and *jamun*. The domestic consumption had climbed in recent years. These days beekeepers are having a hard time fulfilling demand due to increasing orders from pharmaceutical companies, manufacturers of beauty products, five-star hotels and department stores. Honey is among the 19 major exportable items identified by the NTIS

2010. Europe and the US have barred entry to Nepali honey citing quality issues. However, Nepali honey has been gaining popularity in Japan, China and South Korea, among other countries. However, the chemical residue used by farmers on their crops like mustard, millet and banana is a challenge

According to the beekeeper's association, 40,000 people are directly or indirectly involving in honey production while 200 people are engaged in packaging and marketing. The country produced around 2050 MT of honey this fiscal 2016/17, up by 26 percent compared to last fiscal year (Source: Ministry of Agriculture Development). Nepali honey accounts for 45 percent of the total consumption in the country. Nepal Honey, Himalayan Honey, Gandaki Honey, Gorkha Honey, Namaste Honey, Shakti and Himali Honey are some of the top brands of honey in Nepal. Nepali honey has been competing with Indian brands like Dabur Honey and Patanjali Honey.

Demand for honey is increasing in the domestic, regional and international markets while production is declining in the European Union (EU) and the Americas because of bee diseases and pests. The EU, Japan and the US are the major import markets for honey. The EU is the largest market for honey.

Quality standards, good practice guidelines and legislative requirements keep sub-standard honey out of the market to safeguard consumer health. The environmental contaminants of honey are pesticides and heavy metals while the main contaminants of honey from beekeeping practices are the pesticides and antibiotics used to control bee pests and diseases. The main global standards that apply to the import and export of honey are contained in the codex alimentarius—a collection of internationally recognized standards, codes of practice, guidelines, and other recommendations relating to foods, food production, and food safety. Both the codex alimentarius and the EU set strict limits on the residues of veterinary drugs, pesticides and heavy metals in honey and demand that exporting countries have systems in place to monitor residues. The EU requires monitoring for the presence of residues throughout production, collection and processing.

Nepal has one indigenous species *Apis cerana* and another Italian honey bee species *Apis mellifera* which was introduced into the country in 1990. These bees feed on the area's great diversity of flowering plants. Following map shows the potential district as per the availability of bee flora. There is difference in bee flora species diversity and abundance in different land use system, bee flora plants in all land use types. Hence closed forest area is good source of bee forage; with more diversified species of important bee flora plants and relatively less in cultivated rain fed lands.

Honey flow season in Pyuthan district was found to be occurring mostly from September to October as well as from May to June. The abundance of honey bee flora in Pyuthan and especially around Buddanda was observed during the field survey.

Forest area was good source of bee forage; with more diversified species of important bee flora plants and relatively less in cultivated rain fed lands. In the study area forest plant like Chiuri, Rudilo, Jamun, Sal, Sissoo, Uttis, Simal, Mahuwa, Palas are very important bee forage species for honeybees and main source of pollen and nectar. Other horticultural plants like Drumstick (sitalchini), Citrus, Litchi, Guava, Chutro, Aaiselu are also important bee flora in the study area. Hence, most of the important bee flora plants were in bloom from August to October, and this is peak period honey bee foraging activity with strong colony strength as well as peak time of honey harvest. In dry season particularly from January to March and the colony strength will be weak. Generally, in the study area there was good potential availability of bee forage in the rainy season.

According to the study conducted in Baddanda village of Pyuthan about 58% of the bee visited

plants are perennials while 42% are annuals. Floral calendar for beekeeping is a timetable that indicates to the beekeeper; the approximate duration of the blossoming periods of the important honey and pollen plants.

#### ***Gender Integration in The Value Chain***

Nepal is predominantly an agricultural country. Workforce in this sector is mainly women. Approximately 80% of the agriculture workforce are women. However, the study shows that beekeeping in Nepal has been predominantly men's activity. The development and promotion of beekeeping through the involvement of NGO's has encouraged women's participation through beekeeping projects. Women participation in beekeeping is increased however, there are still various factors limiting and constraining the involvement of women.

For beekeeping enterprise, it doesn't need farmland which most women don't have it or can't afford it. Keeping four modern hives, needs less than 100 m<sup>2</sup>. land, but the income is equal to growing crop in half a hectare of land. It doesn't need much labour and doesn't create additional burden particularly for female-headed HHs. Beekeeping doesn't need most of the expensive agricultural inputs like seeds, fertilizer, oxen to plough the land etc. Beekeeping is relatively less vulnerable to disaster shocks as compared to crop. It is a seasonal activity and inspection can be done in spare time. Strong potential for income and employment generation mainly to women and landless youth. Beekeeping can be done in spare time and at homestead where women can manage/engage. The products have high market demand at national and international level.

Women involvement in beekeeping groups was limited by various constraints such as lack of time, awareness, and knowledge of taking care to bees and the belief that beekeeping is a man's activity. In comparison to men, women face higher disadvantages in terms of mobility, access to productive assets, productive resources and access to market information with the result that they find it difficult to access and maintain profitable market niches and capture a larger slice of income for the household. The role of women in beekeeping enterprise in surveyed district is presented in Table 7.

**Market Analysis and Strategy**

Although there are advantages and benefits of beekeeping in Nepal, there are different problems and challenges in this

enterprise. Below are some of the problems and challenges in beekeeping in Nepal.

It has been found that there are number of underlying constraints in the honey sector. First and the most important constraint is the poor yield of honey which in one hand does not meet the demand of the farmers in the regions and on the other hand does not allow the farmers to link with the major commercial honey market due to the lack of scale. Absence of linkage with the commercial honey market also does not allow farmers to consider honey as a cash business. Both of these inter-related issues have created a vicious circle which hinders the honey sector to grow in the country and especially in the mid-hill districts. Underlying reasons responsible for this situation are prioritised in Table 8.

**Table 7: Gender analysis of beekeeping enterprises in study district**

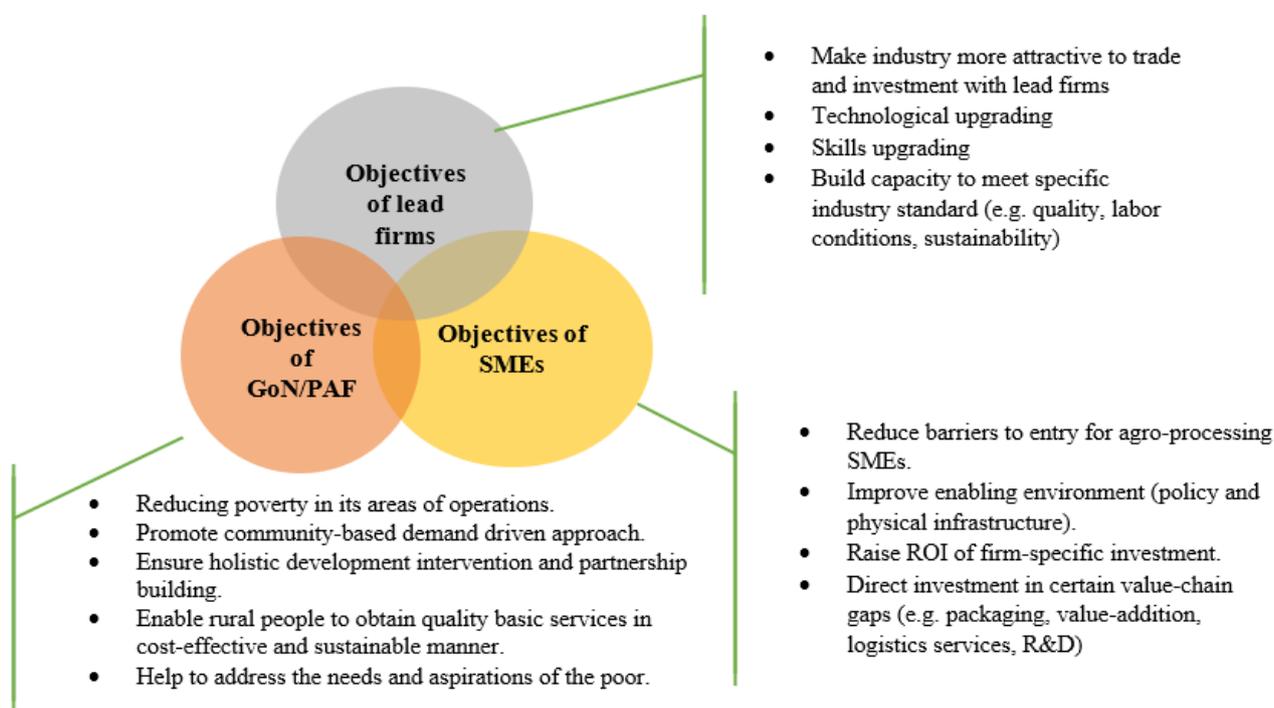
Activity in production	Task Division		Explanation
	Men	Women	
Decision on the hives to be installed	✓✓	✓	Discussed between men and women. But decision made by men based on economic reasons.
Buying inputs	✓✓	-	Men buy inputs while they go to the markets.
Management of hives	✓✓	-	Men are the decision makers.
Migration	✓✓	-	Mostly conducted by men.
Disease and pest control	✓✓	✓	Decision on time and application made by men. Contribute labour by women also.
Harvesting	✓✓	✓	Conducted mostly by men and support by women.
Primary level processing	✓	✓✓	Mostly done by women.
Packaging and Storing	✓	✓✓	Mostly done by women.
Transporting	✓	✓✓	Transporting from field to home conducted mostly by women. Transporting to local market done by women but for the outside market by men.
Selling honey	✓	✓	Women do the selling at local level. Price negotiation done by men.

Source: Field survey (May, 2018)

**Table 8: Intervention areas and expected outcomes of honey under market analysis and strategy**

Intervention areas	Expected results/Outcomes
Capacity strengthening	<ul style="list-style-type: none"> <li>• Production capacity of beekeepers increased.</li> <li>• Collection systems established.</li> <li>• Beekeeper Extension System Established</li> <li>• Beekeeper cooperative formation and strengthening</li> <li>• Input supply system developed</li> </ul>
Market linkages	<ul style="list-style-type: none"> <li>• Market linkages for producers and processors for table honey and beeswax facilitated.</li> <li>• District/regional market profile prepared.</li> <li>• Market and business linkages brokered.</li> </ul>
Financing	<ul style="list-style-type: none"> <li>• Beekeepers accessing finance.</li> <li>• Honey/Bee Wax Processors/Exporters Access Financing.</li> <li>• Input providers accessing finance.</li> </ul>
Good governance	<ul style="list-style-type: none"> <li>• Honey stakeholders meeting.</li> <li>• Stakeholder forums at district/provincial/national level to coordinate and regulate the honey sector.</li> <li>• Beekeepers represented and heard at national, provincial and local levels.</li> <li>• Bee keeping Cooperative auditing system established.</li> </ul>
Quality Management and Certification System	<ul style="list-style-type: none"> <li>• Establish a quality management and certification system for honey.</li> <li>• Dissemination of the honey standards and certification guidelines.</li> </ul>

Source: Field survey (May, 2018)



**Fig. 5:** Suggested alliance model for honey sub-sector value chain development in Nepal

### **Suggested Alliance Model for Honey Sub-Sector**

Government of Nepal (GoN) effort should focus on creating alliances and bring them into the centre of development. PAF support should create a more business phenomenon at the project level by addressing problems of disintegration and lack of integration. GoN should stimulate public and private sector programs through the linkages to larger firms with small scale producer's organisations. The alliance should focus on relationships, alignment and trust. The alliance members should share responsibility for delivering, shared risk as well as delivery which promote collaboration and finding solutions (Fig.5).

The implementation of programme through the alliance will bring value. This may require specific support. The important role that lead firms can play within value chains for their mutual benefit, the nature of the linkages between the value-adding SMEs and the lead firms, and how to generate and deepen these linkages. Further research is necessary to define opportunities to bring lead firms together with small and medium enterprises (SMEs).

### **Conclusion and Recommendations**

Looking at the demand-supply situation in the surveyed district as well as in the national market, it is evident that there is a huge potential of honey in the country. With the increased production of honey in the mid-hill region, the current demand supply gap within the districts can be reduced over the years. If the quality of queen with other quality inputs and cultivation practice of honey can be improved in large scale in the districts, eventually, it can

also supply honey to the Kathmandu and other major cities of Nepal to meet the unmet demand of honey and hence, can substitute import. In the surveyed Pyuthan district there are about 650 farm household involved in honey production. About 150 MT of honey was produced during 2017 in Pyuthan district which has increased by 20% this year as compared to previous year. As per the information provided by the Federation, there are 5000 bee hives in the district. Survey finding reveals that a higher percentage of women as compared to men are working in honey farming. There is about 45% of out-migration, farming is being taken care by the women in many households. About 35% of women are involved in beekeeping. Therefore, beekeeping is a suitable business for them. So, its development holds the prospect of raising income of several rural households and create opportunities for additional employment.

There are also several constraints in the honey sector. As farmers lack the knowledge regarding appropriate beekeeping, their awareness must be raised in this regard. Both the government and private companies play significant role in addressing the knowledge gap of the farmers. New queen production technology can be introduced in the project location to improve the efficiency and effectiveness which farmer mostly use queen of inbred for honey production. While there is value in involving every farmer, who is interested in beekeeping, priority should be to start with those who are already practicing beekeeping. Most of them use traditional inbred queen and rearing practices, it is advisable to improve their basic technology so that other people may develop interest and learn from their successes.

The study realized that the hills needed a special package of practices for beekeeping that supported promotion of *Apis cerana*, which include training activities, technical supports and extension of low cost technology to increase the productivity of *Apis cerana* colonies. In the Terai, *Apis mellifera* was found promising in terms of honey production, harvesting frequency, per capita colony holding and annual income, where commercialization of beekeeping with *A. mellifera* can earn higher than crop production. The demand of honey in both the domestic and external market is growing and to meet the demand an advanced apicultural research and extension mechanism including crop pollination and beekeeping trainings, a secured market for honey and formulation and implementation of clear beekeeping policy and guidelines by the government are recommended. Bee Policy (2015) has created conducive environment in enterprise development, employment creation and poverty alleviation.

Honey being the priority sector for the Government of Nepal, the project will find the government supportive in promoting honey in the mid-hill districts. So, looking through all the perspectives, it makes sense for the Poverty Alleviation Fund (PAF) project to work on to develop the honey sector in the country.

### Author's Contribution

P.L. Bhandari and R.R. Kattel designed the research plan and P.L. Bhandari performed stakeholders' analysis, collected the required data from field and analyzed the data. Both authors prepared the manuscript.

### Conflict of Interest

The authors declare that there is no conflict of interest with present publication.

### Acknowledgments

The authors are very grateful for the financial support provided by Poverty Alleviation Fund (PAF)/World Bank. We would like to thank Dr. Y. B. Thapa for his guideline and valuable advice of this research as well as Mr. Krishna Bhatta for his field support arrangement.

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